A 5 potential lines B ++ 3

x
y

p+ n+

n- drift layer 1

p- substrate 2

4

Figure 1a

Prior Art

Electric field

E_{cr}

A B x

A 5 potential lines B ++

x
y

p+ n+

n- drift layer 1

oxide 6

p substrate 2

4

Figure 1b

Prior Art

Electric field

E_{cr}

A B x

Figure 2a

Figure 2b

potential lines

10

15   23   ++ 23   14

13

p+   n+

19   17   21   20   22

11   11

Figure 3a

Electric field

E_{cr}

x

p+   n+

potential lines

10

23

15   21   14

13

p+

n+

19   20   ++   23   22
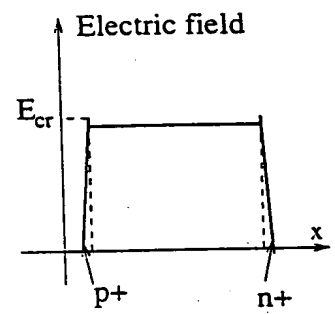
11   11

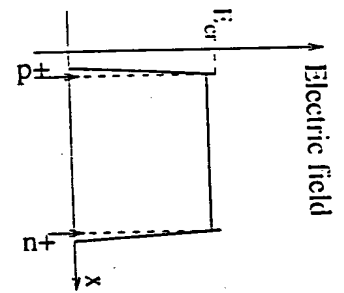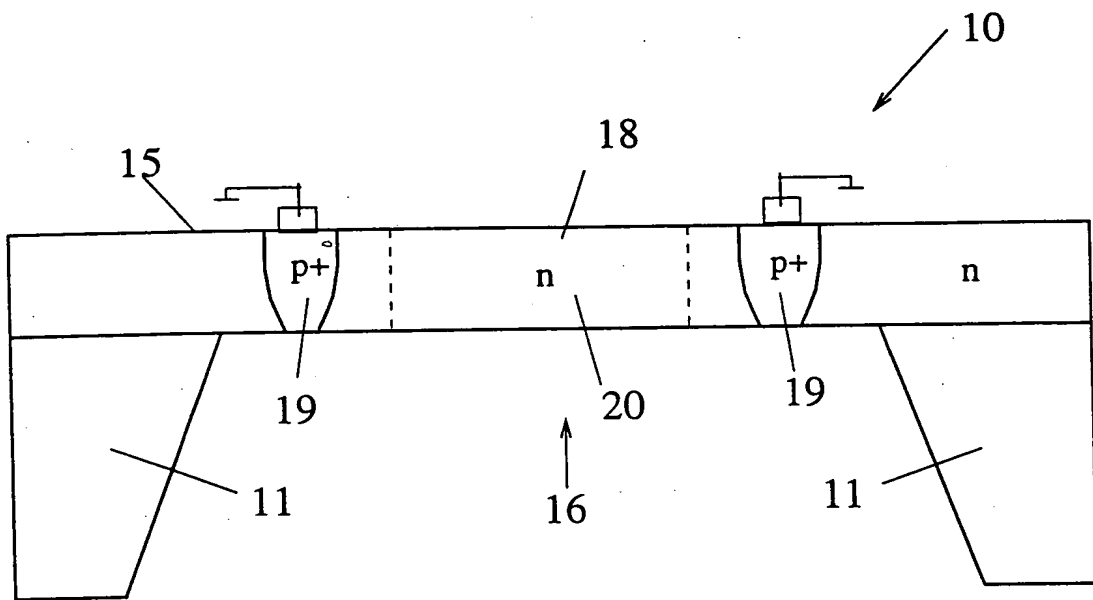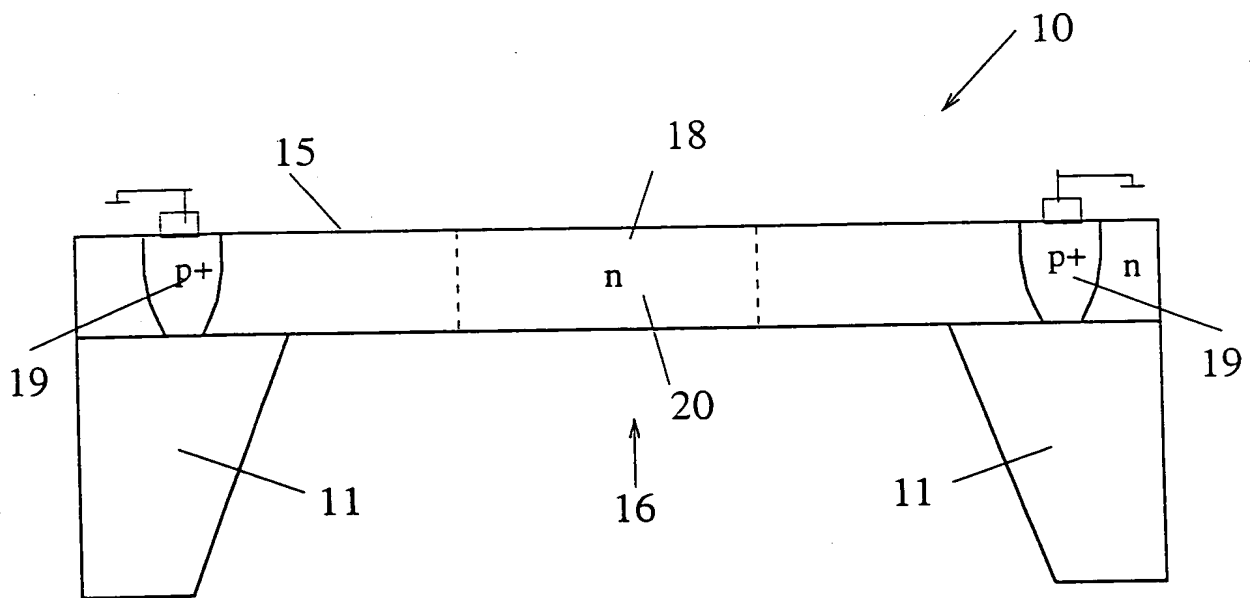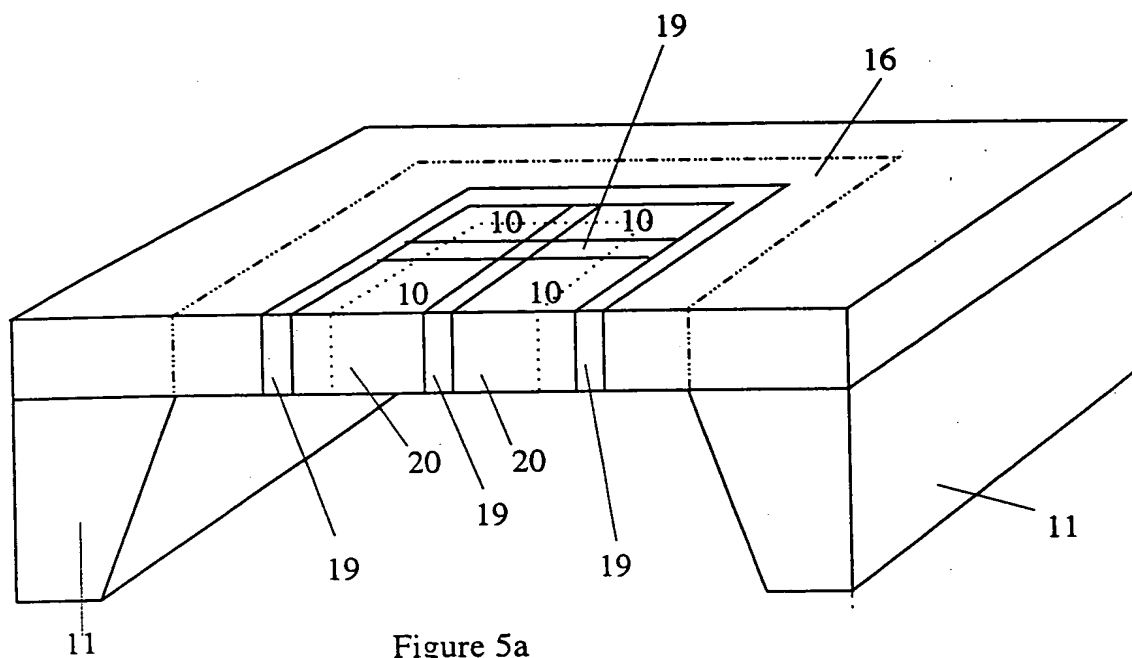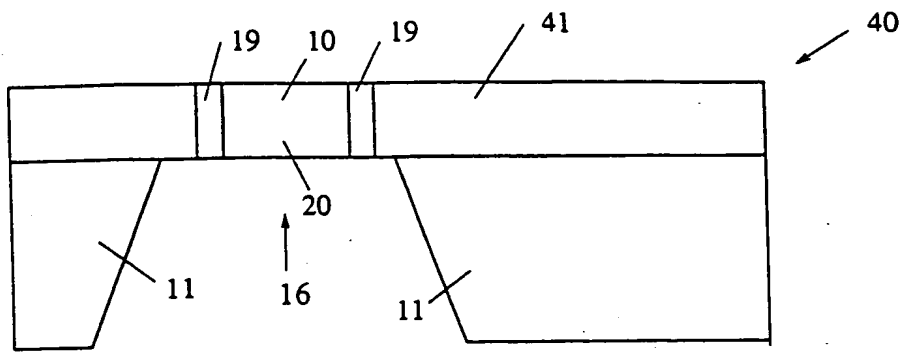Figure 3b

E_{cr}

p±

Electric field

n+

x

Figure 4a

Figure 4b

Figure 5a

Figure 5b

19 10 19 41 40

Figure 6a
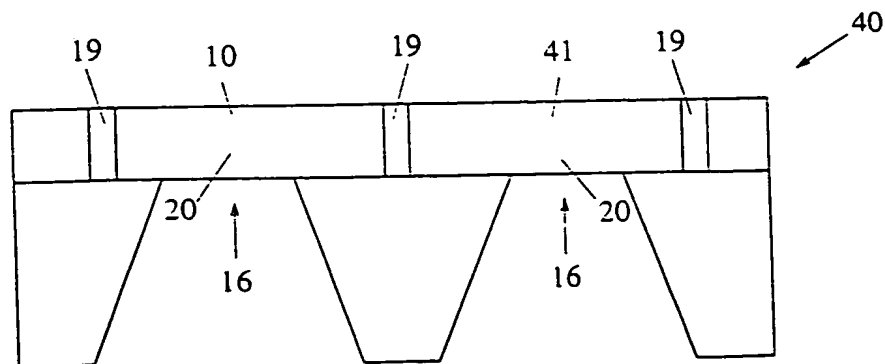
19 10 19 41 19 40

Figure 6b

19 19 19 41 19 40

Figure 6c

19 10 19 41 19 40
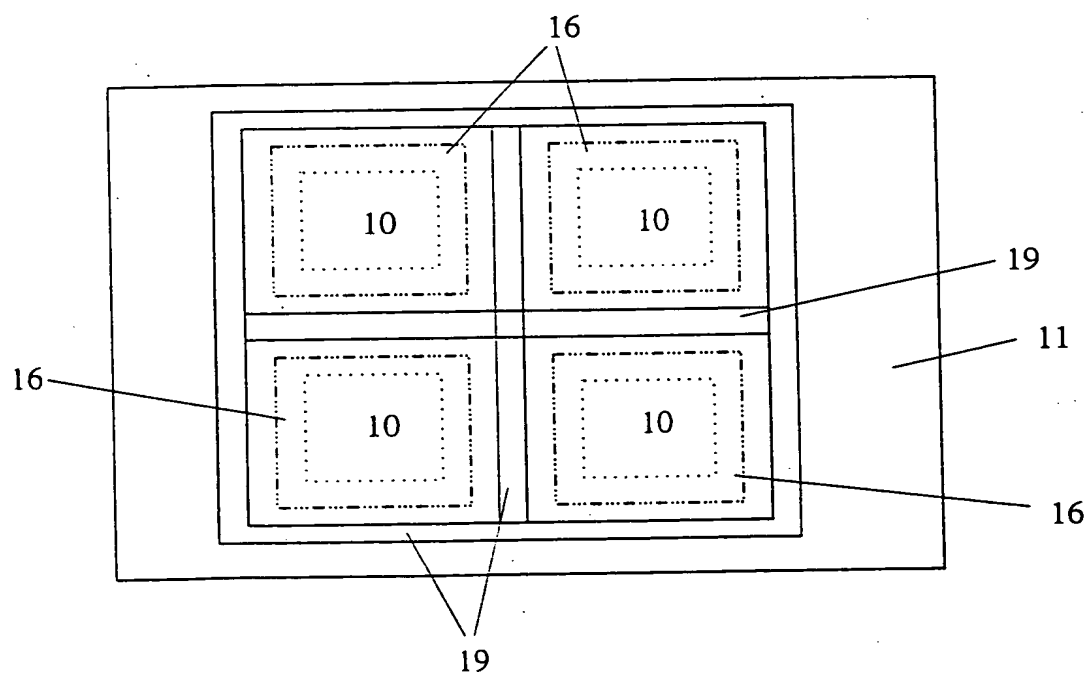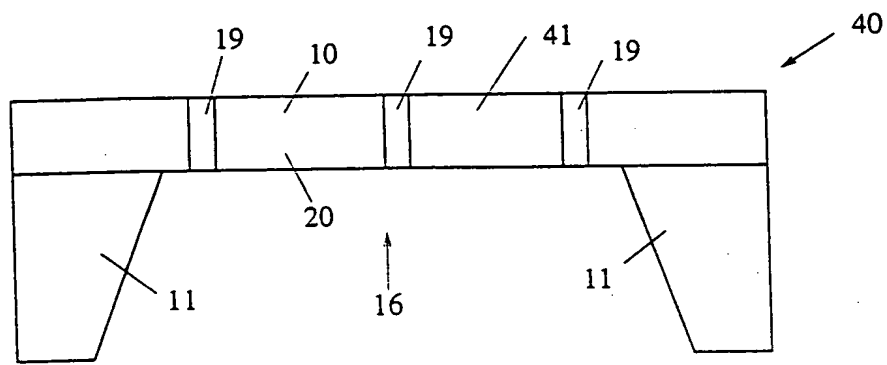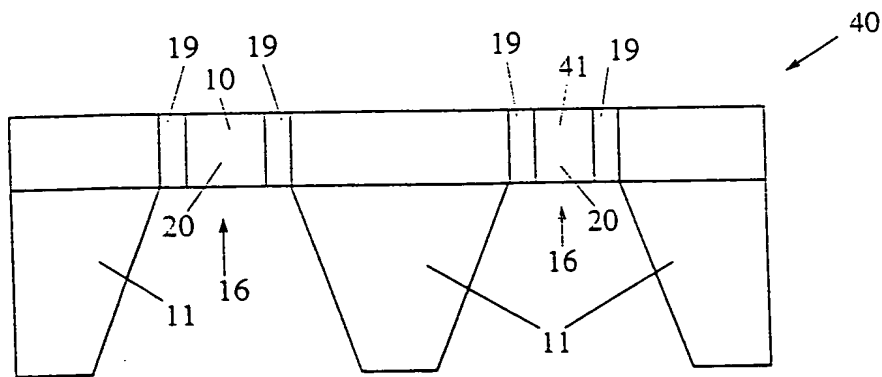
Figure 6d

Figure 7

Figure 8

10

19   18   19   15

19   19

13 { | | | | 51
                                          50
            20   17

11   11

16

Figure 9a

10

19   18   15   19

13 {   51
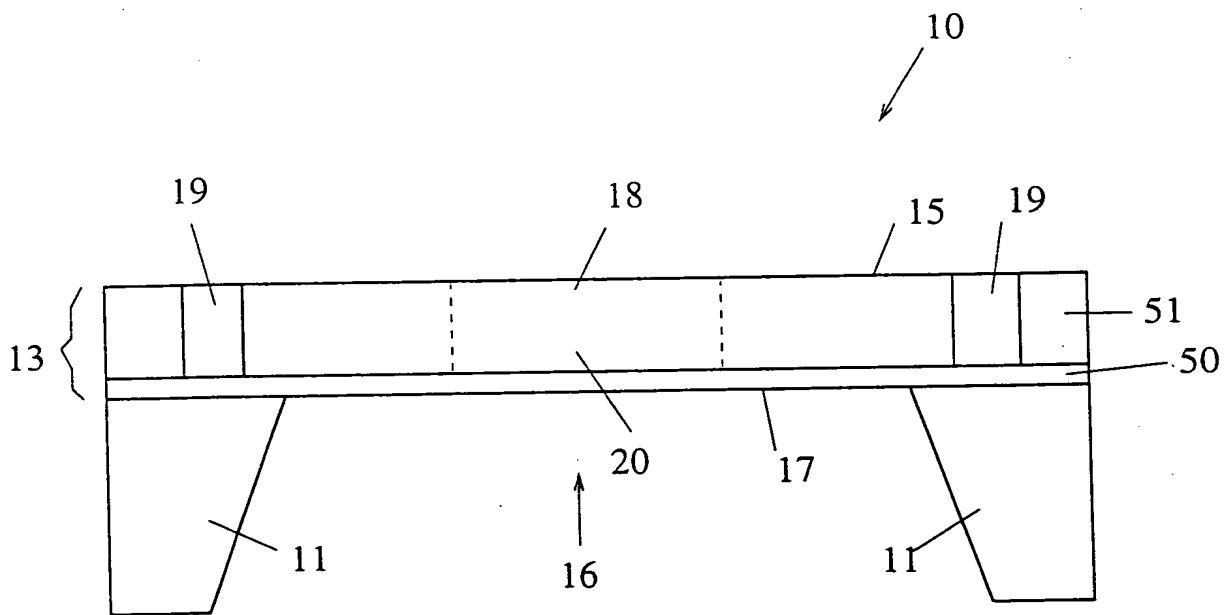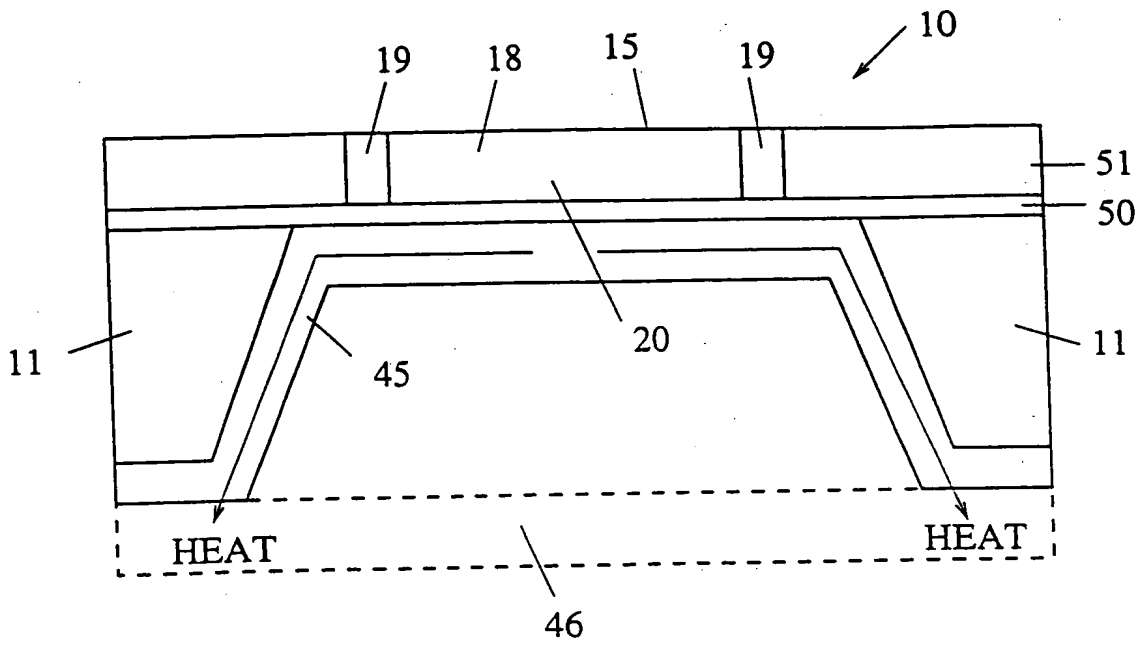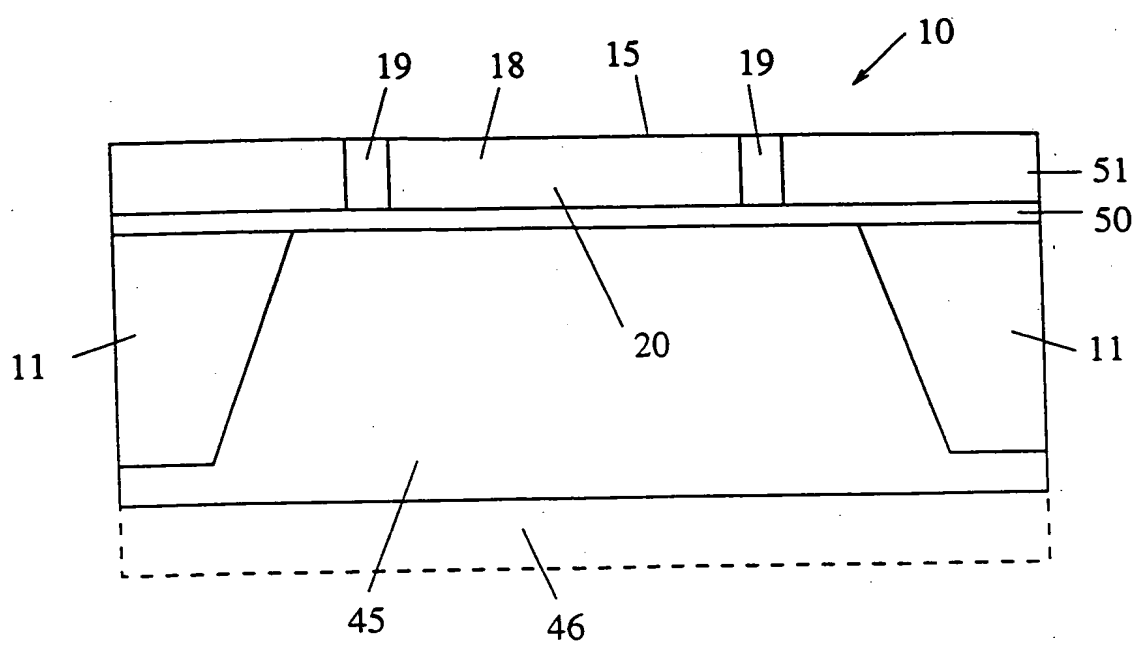   50
            20   17

11   11

16
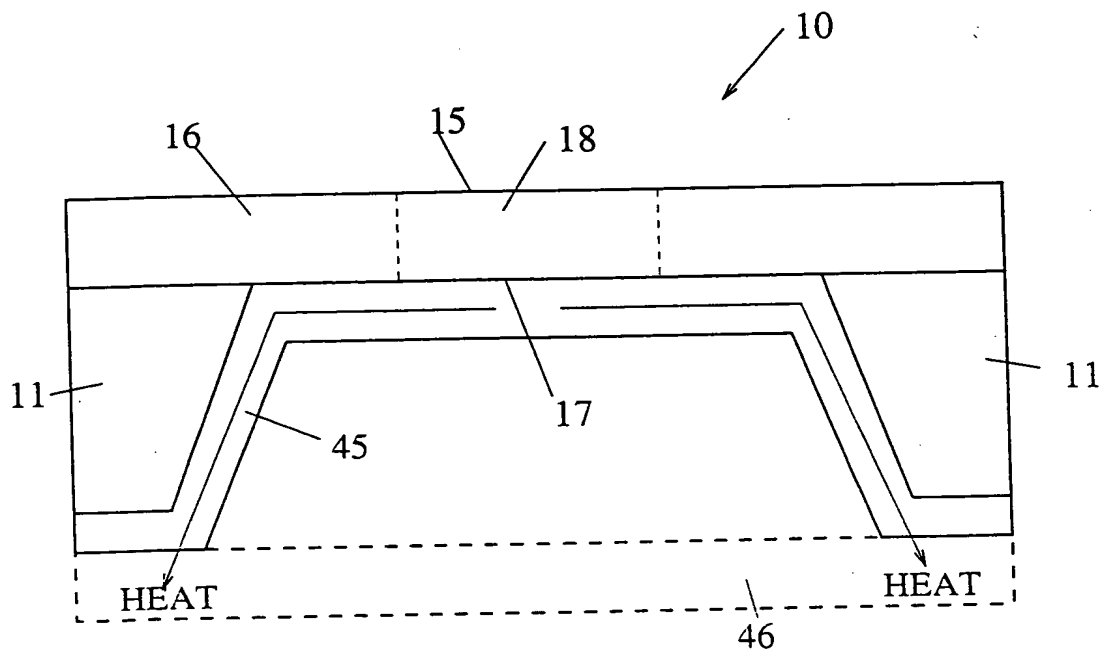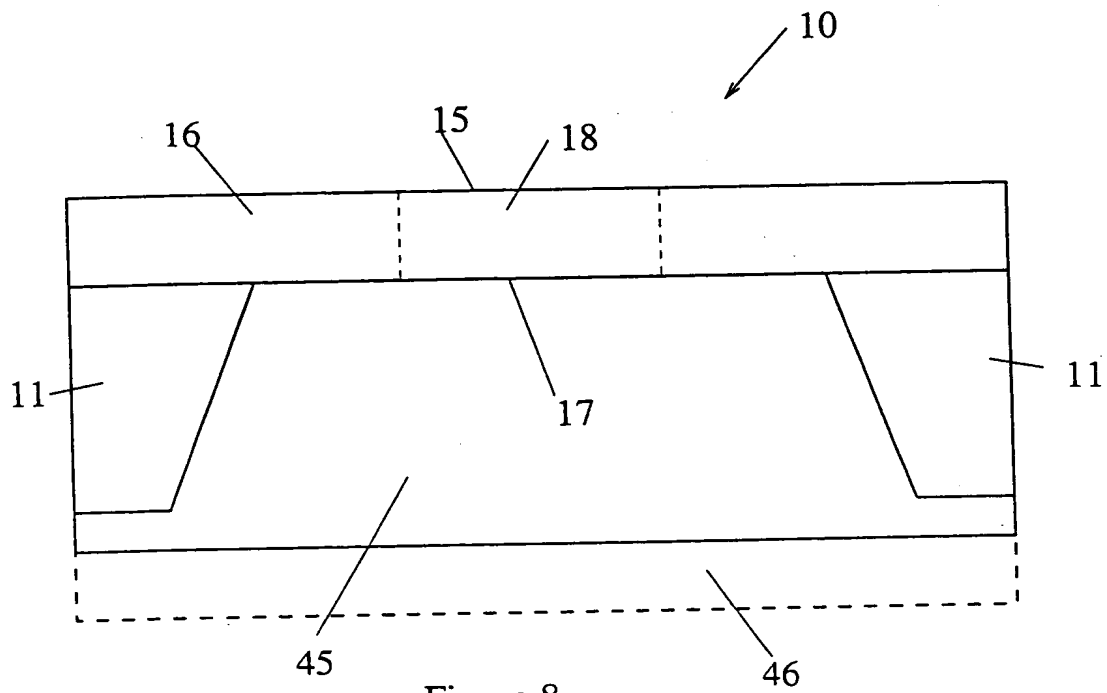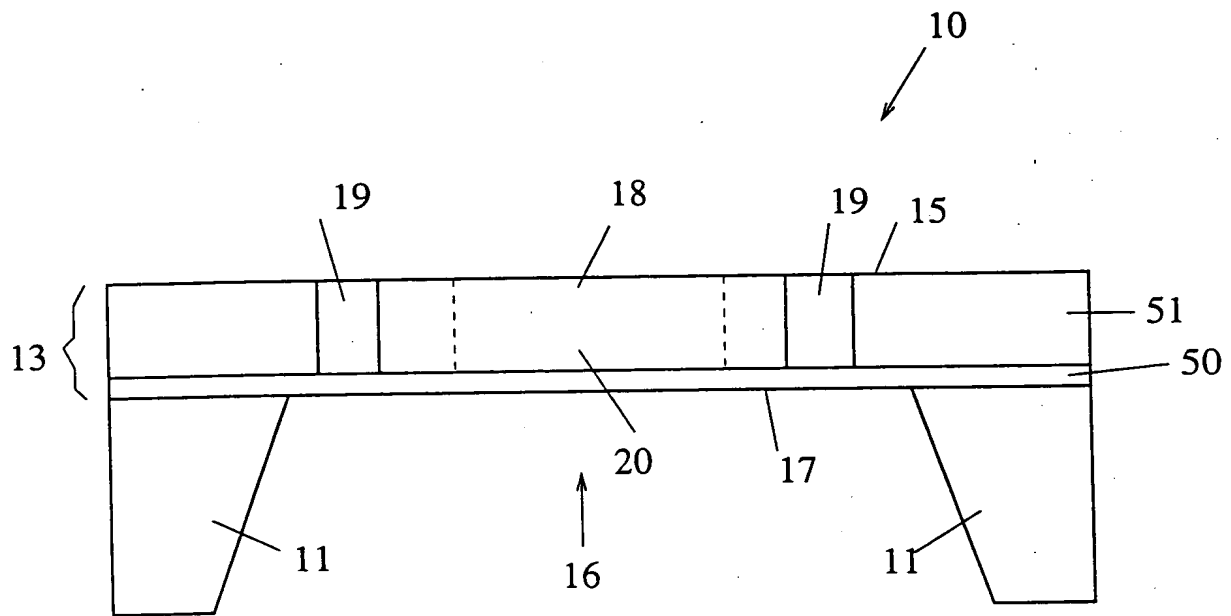
Figure 9b
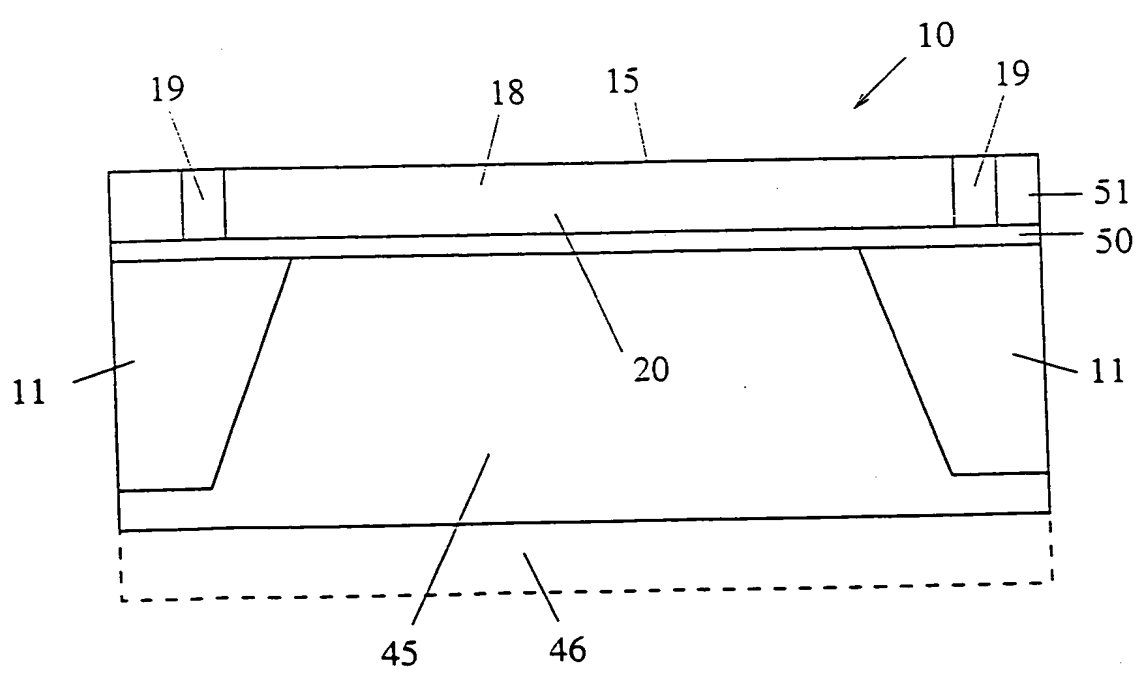
Figure 10a

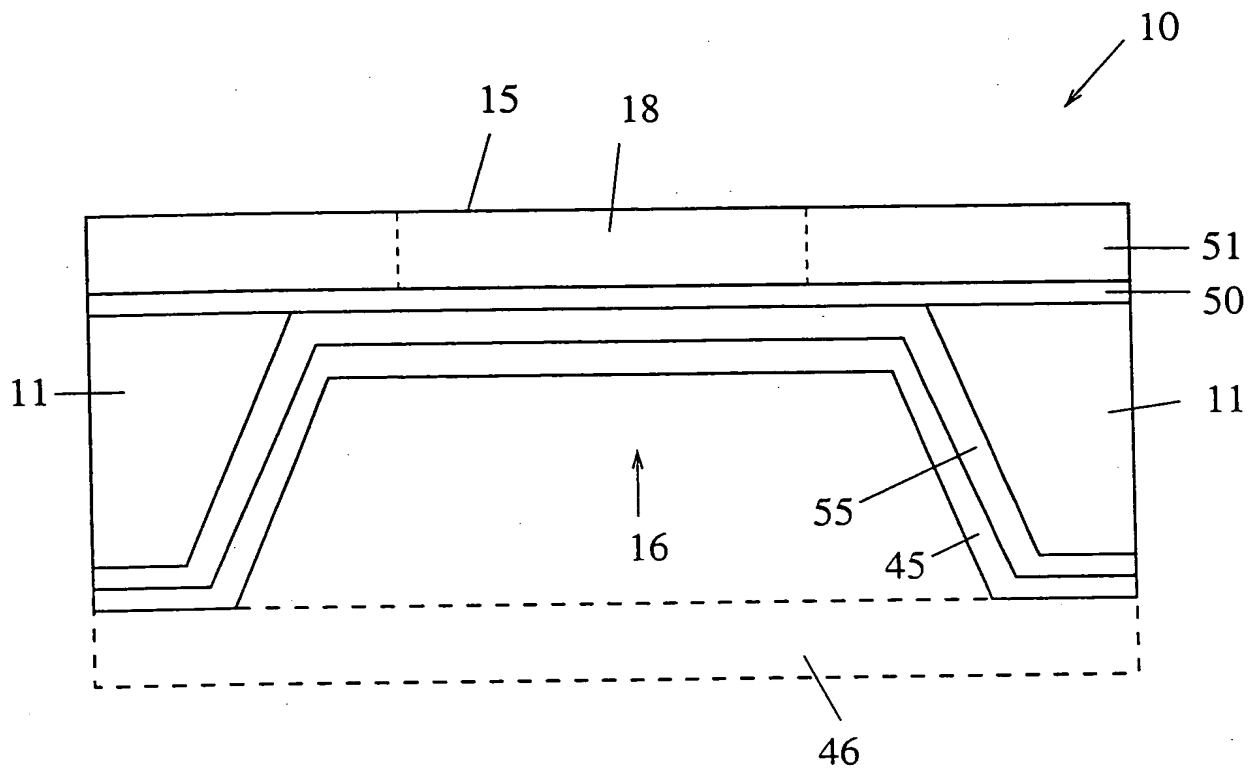Figure 10b

Figure 11a

Figure 11b

15   18   10

51
50
11   11
55
16
45
46
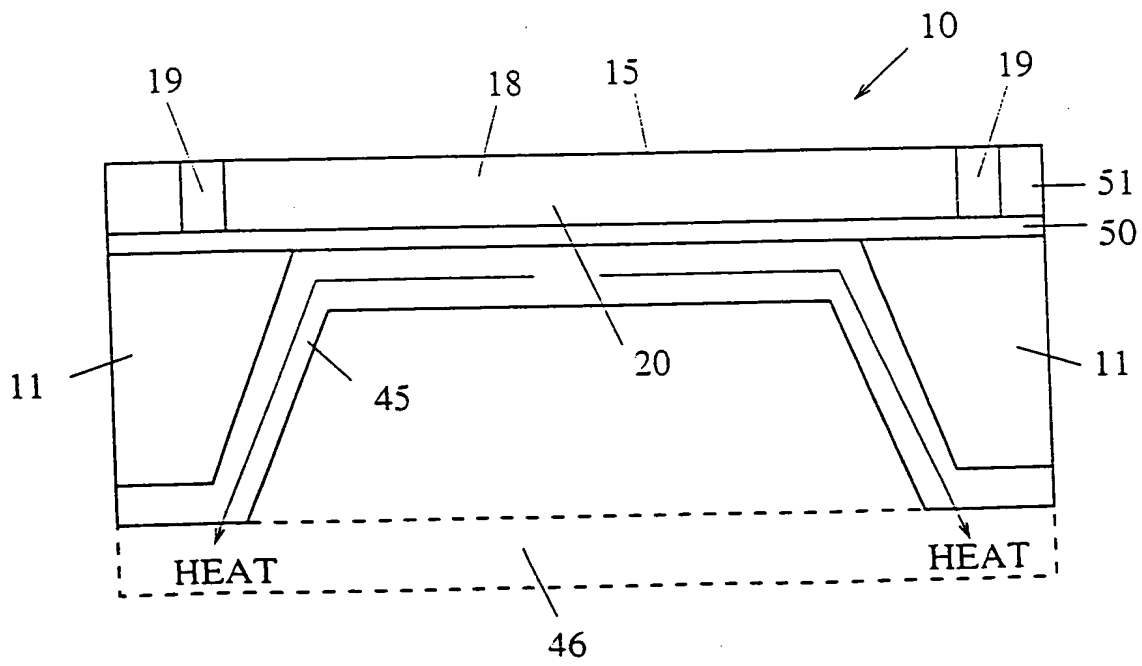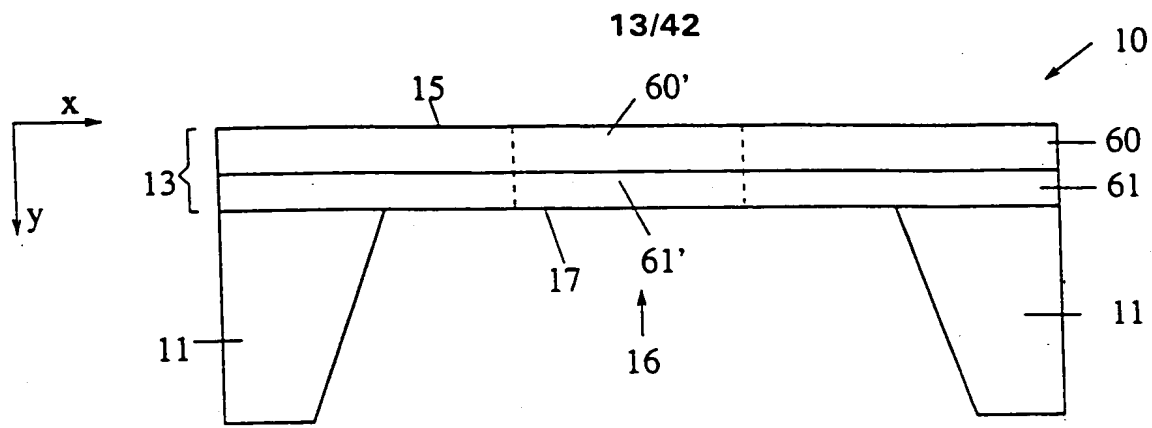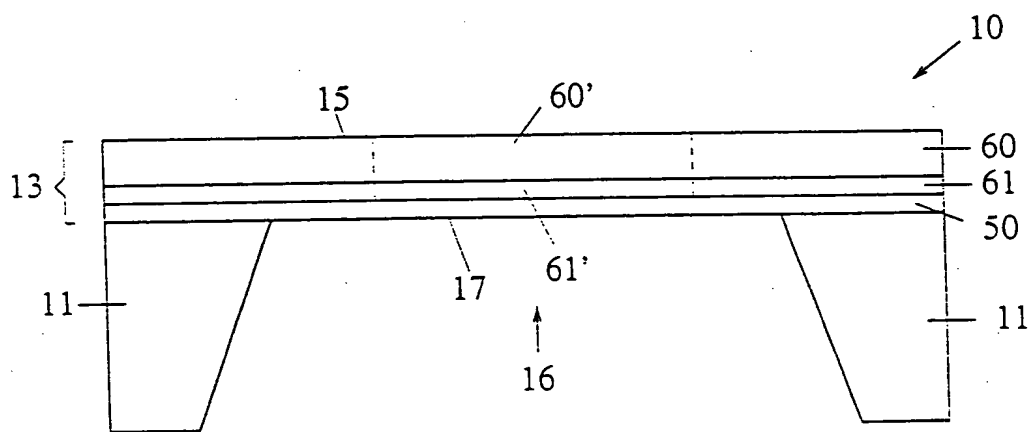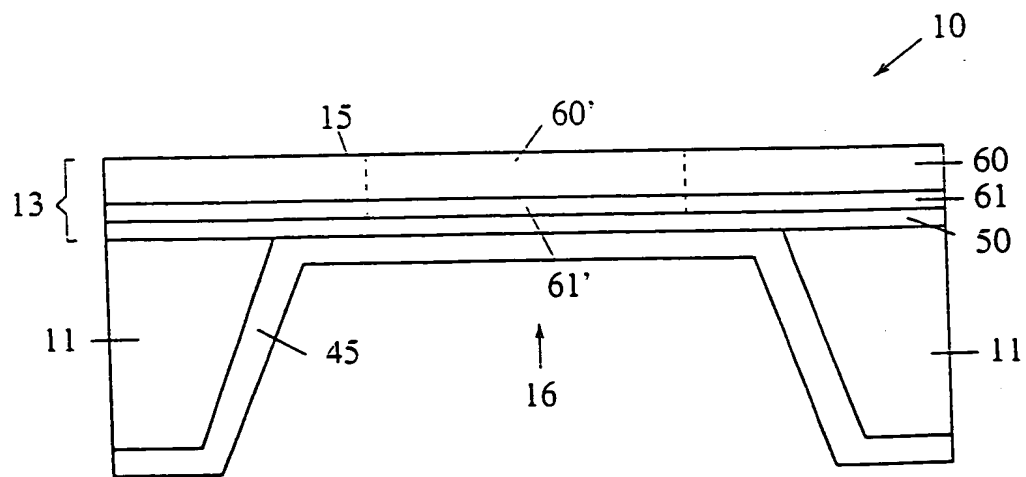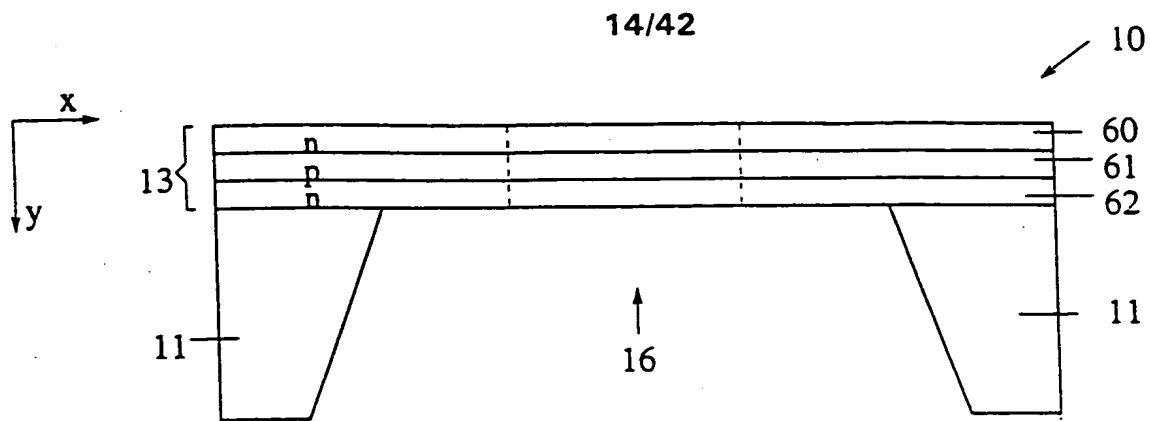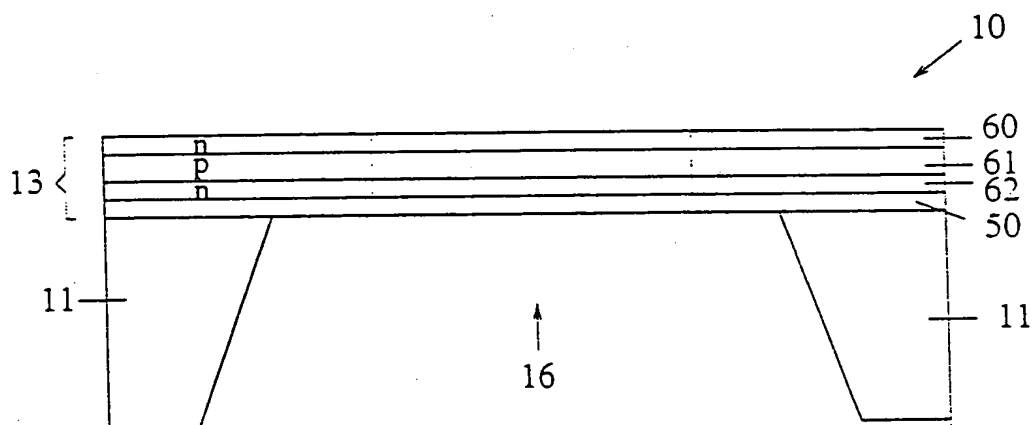
Figure 12

Figure 13a

Figure 13b

Figure 13c

x

13 {
n 60
p 61
n 62

11 — 11

16

10

Figure 14a

13 {
n 60
p 61
n 62
50

11 — 11

16

10

Figure 14b

15

13 {
n 60
p 61
n 62
50

11 — 45   11

16

10

Figure 14c

Figure 15

Figure 16

19   19

20

11   11

16

Figure 17a
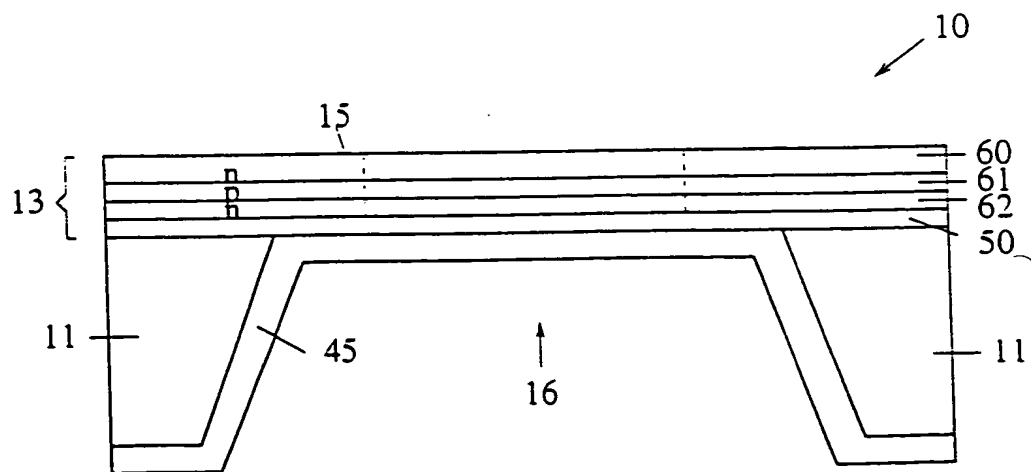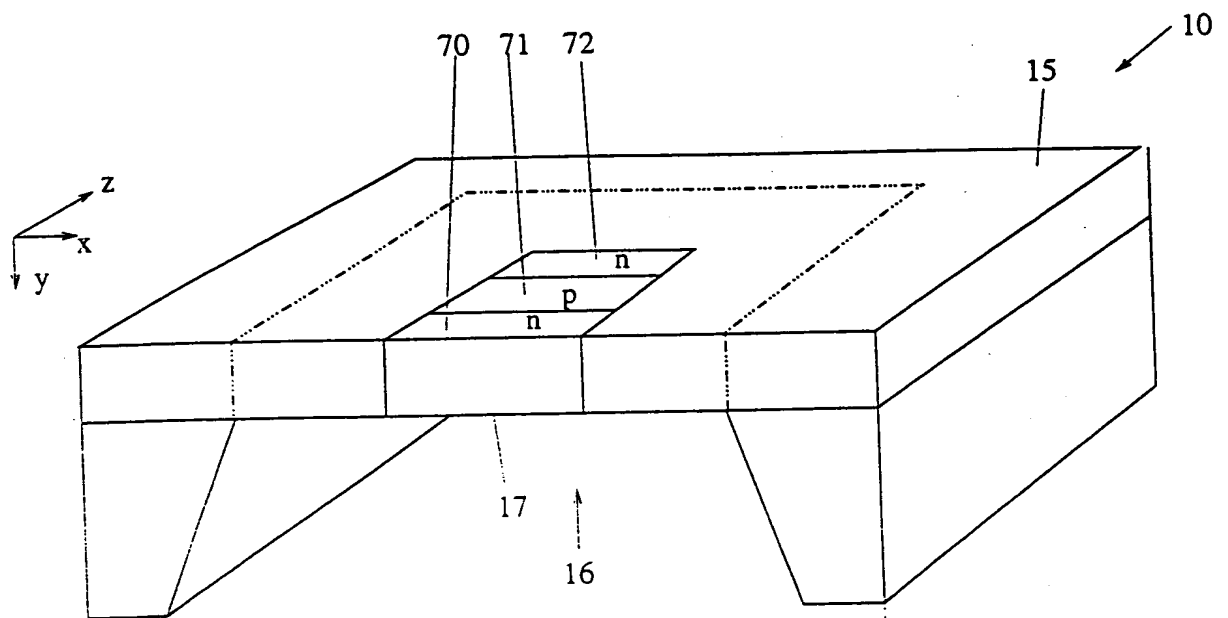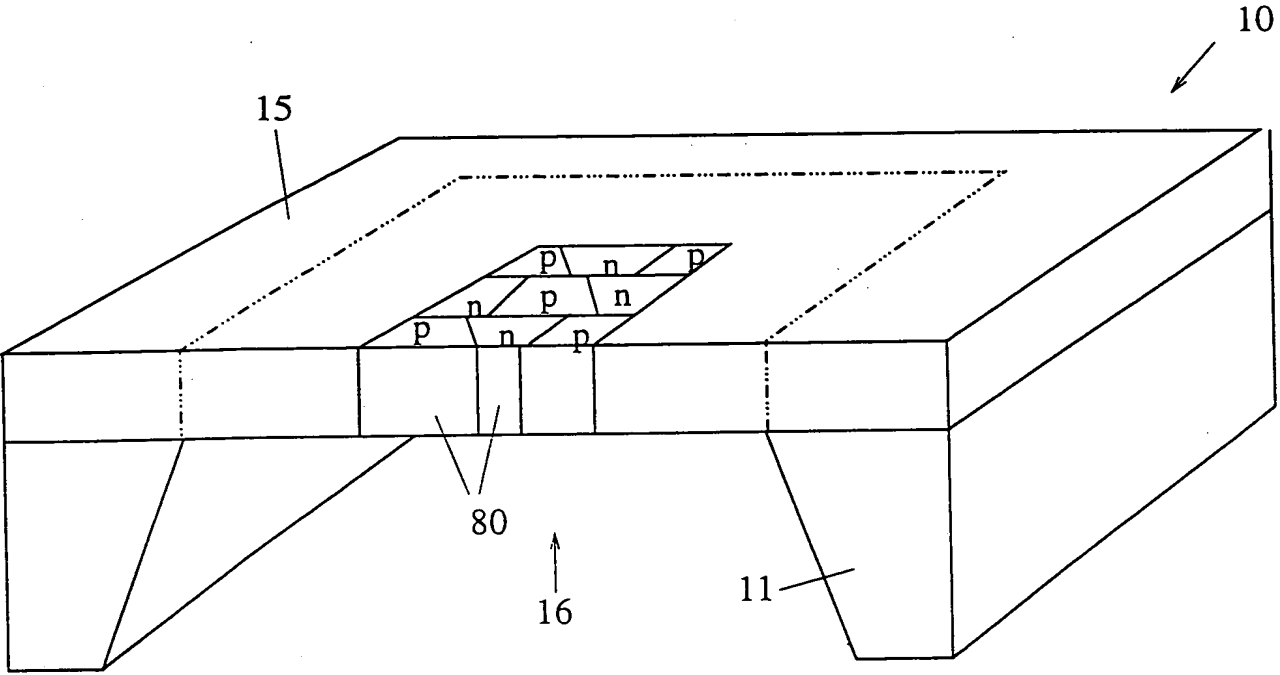
19   19

20

11

16

11

Figure 17b

19   19

50

20

11

16   45

11
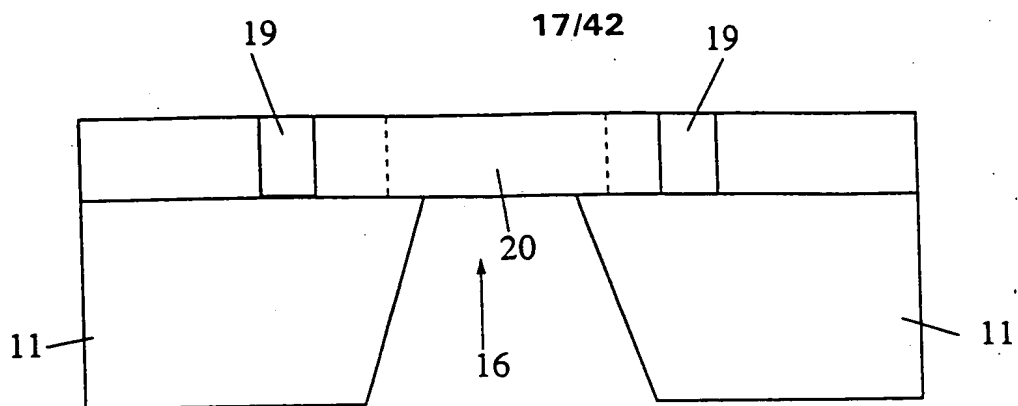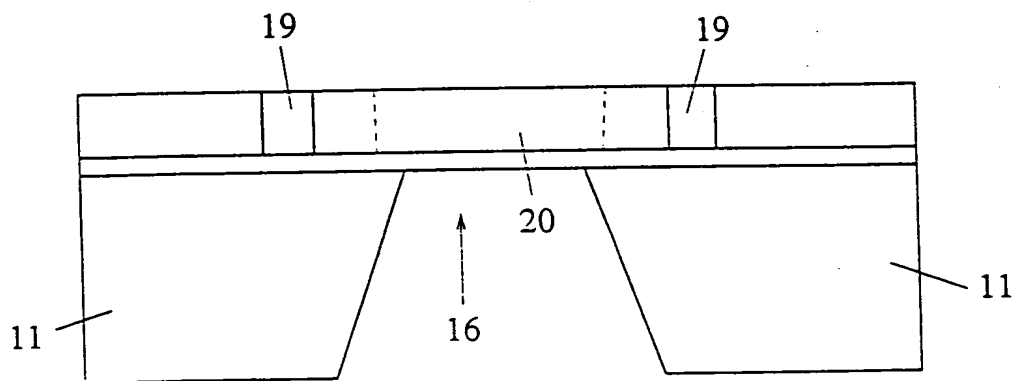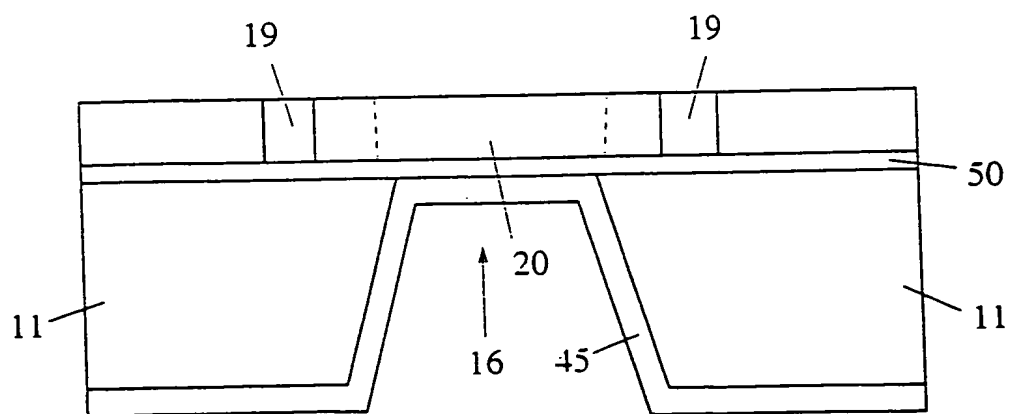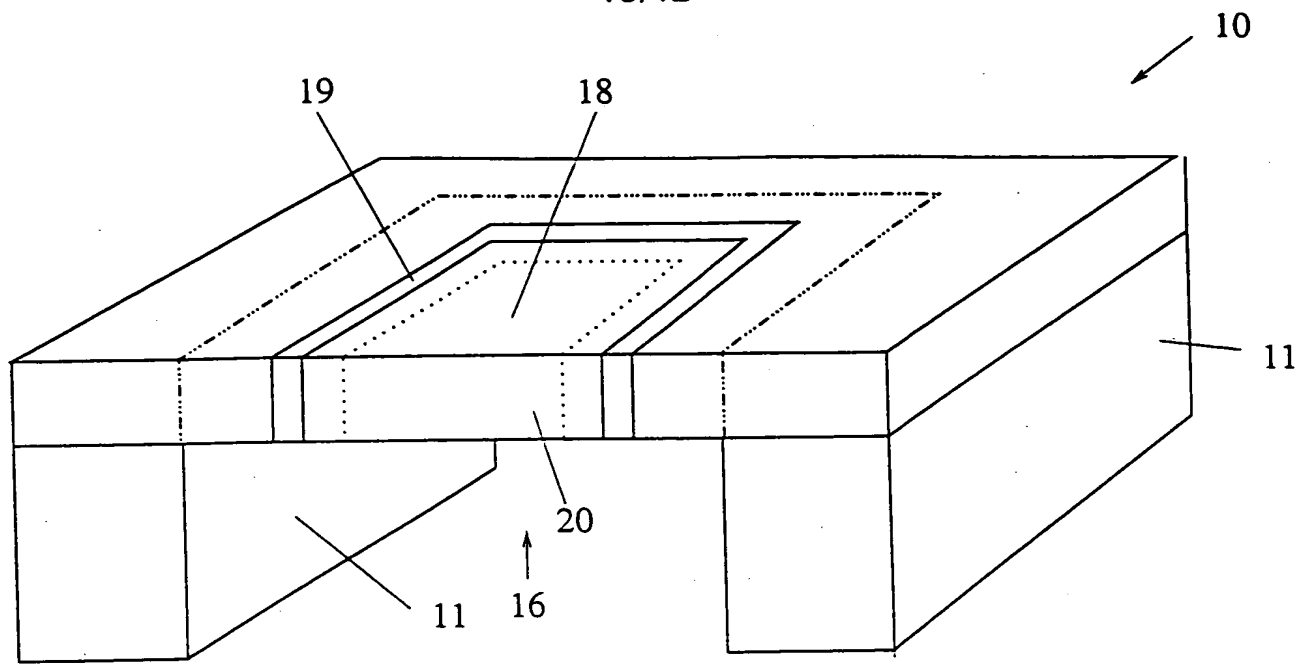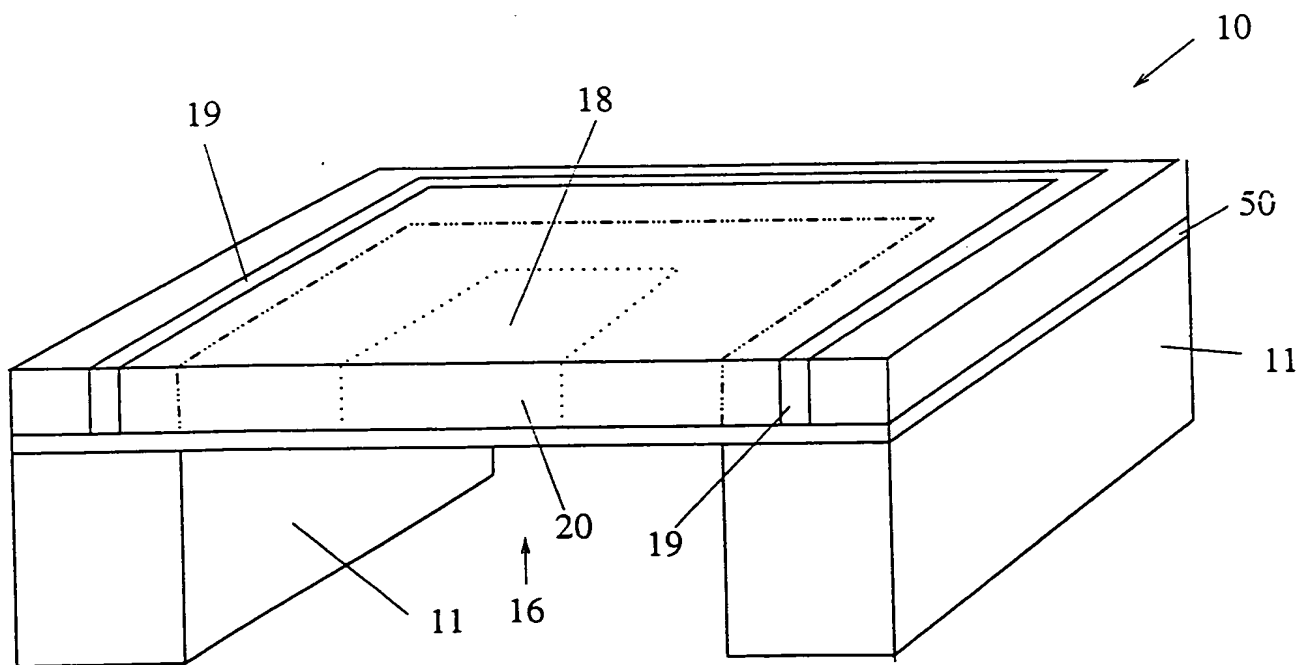
Figure 17c

Figure 18a
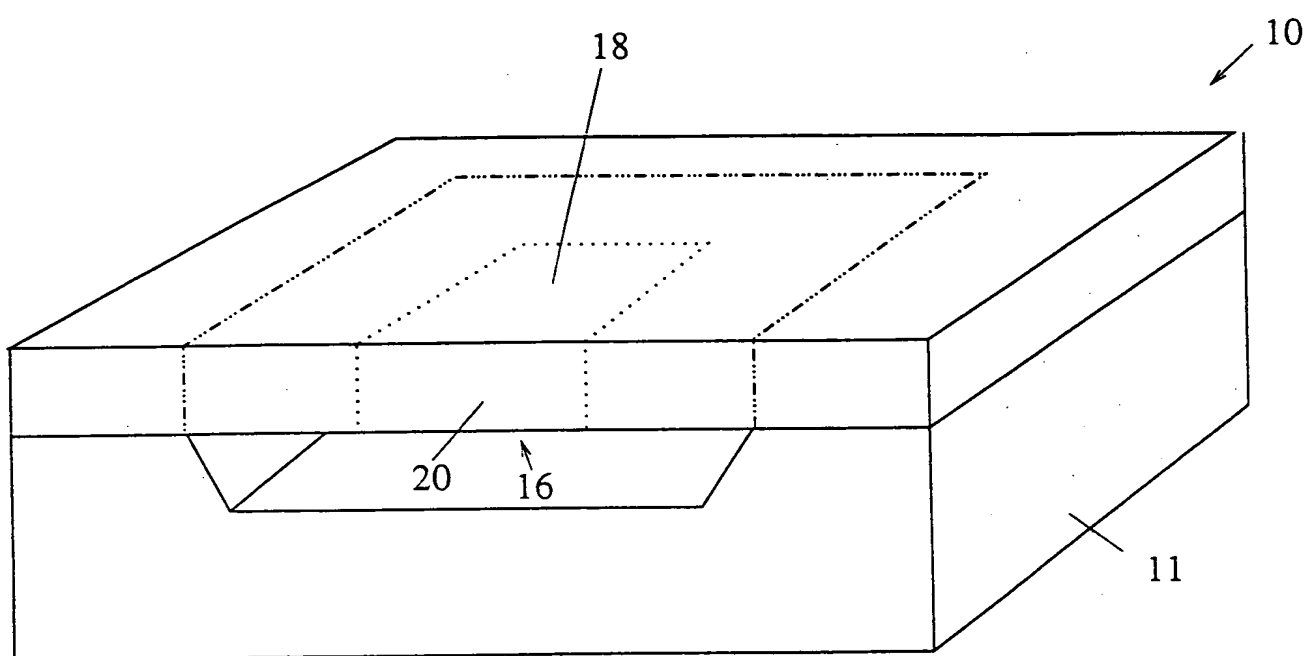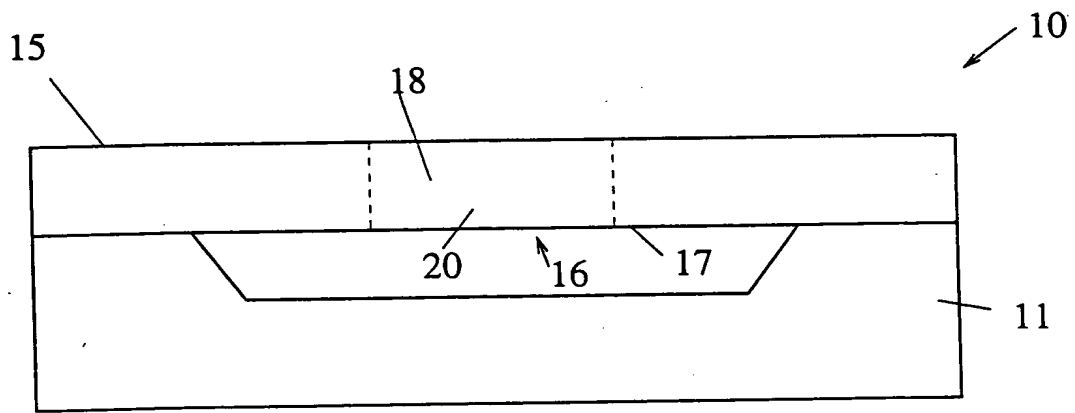

Figure 18b

Figure 19

Figure 20

Figure 21

19   18   19

18

16   20   11

Figure 22a

19   18   19

50

16   20   11

Figure 22b

x

y

15   -V (or ground)   S   93 94   95   FIELD OXIDE 96   D   GATE   -V (or ground)   10

SOURCE   GATE   DRAIN   GATE   SOURCE

P+   p+   n+   p well   n- drift   n+   n- drift   p well   n+   p+   P+

19   90   92   drift layer length   91   92   90   19   11

90   20   20   17   11

12   16

Figure 23a

FIELD OXIDE   10

GATE   DRAIN   GATE

19   SOURCE   SOURCE   19   50

p+   n+   p well   n+   p well   n+   p+

drift layer length

Figure 23b

FIELD OXIDE   10

GATE   DRAIN   GATE

19   SOURCE   SOURCE   19

p+   n+ p well   n+   p well   n+   p+

drift layer length

50   45

HEAT SINK

46

Figure 23c

FIELD OXIDE

GATE   GATE

SOURCE   DRAIN   SOURCE
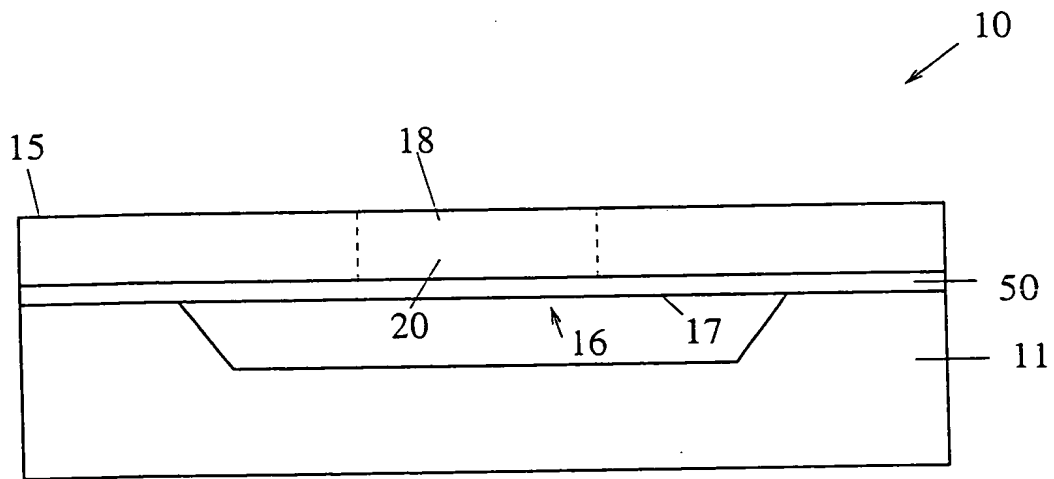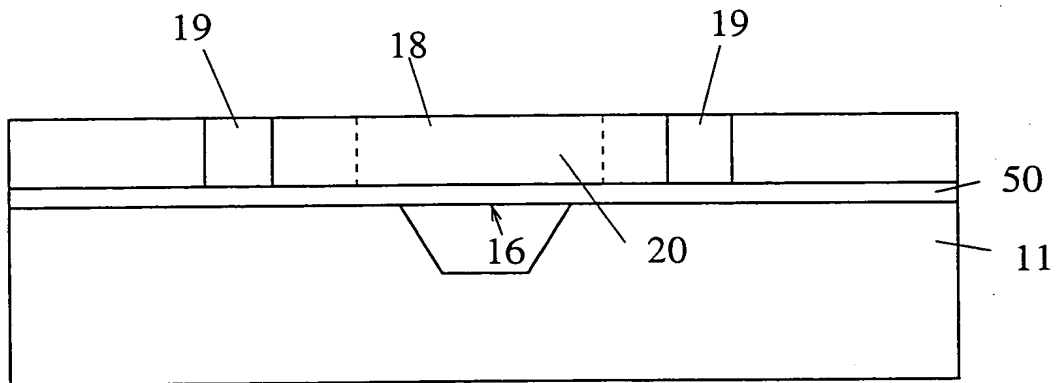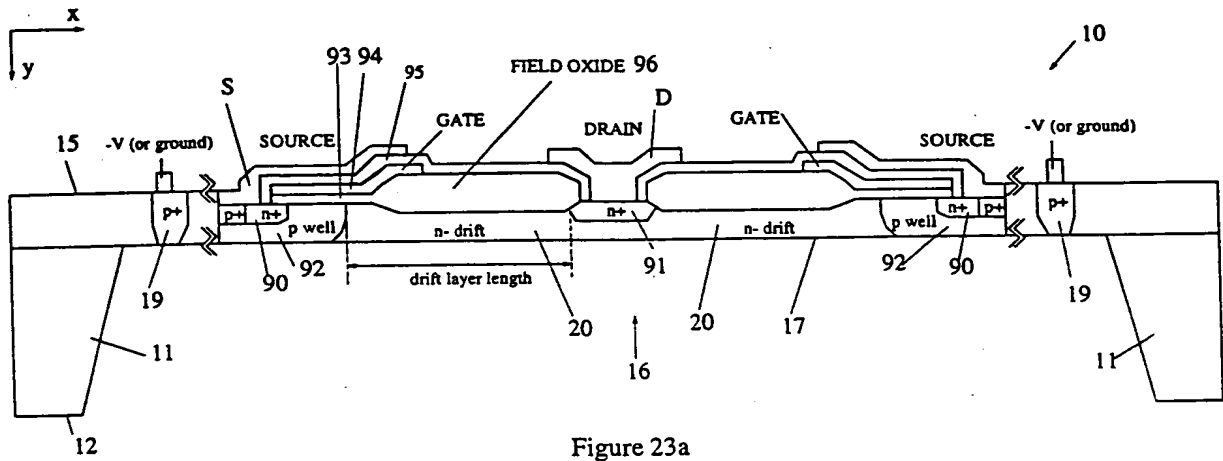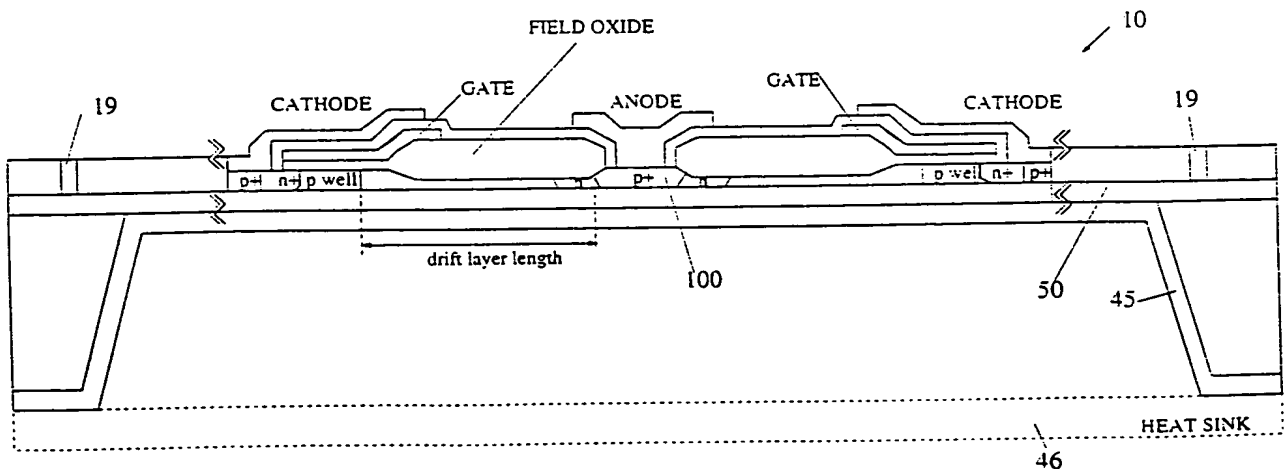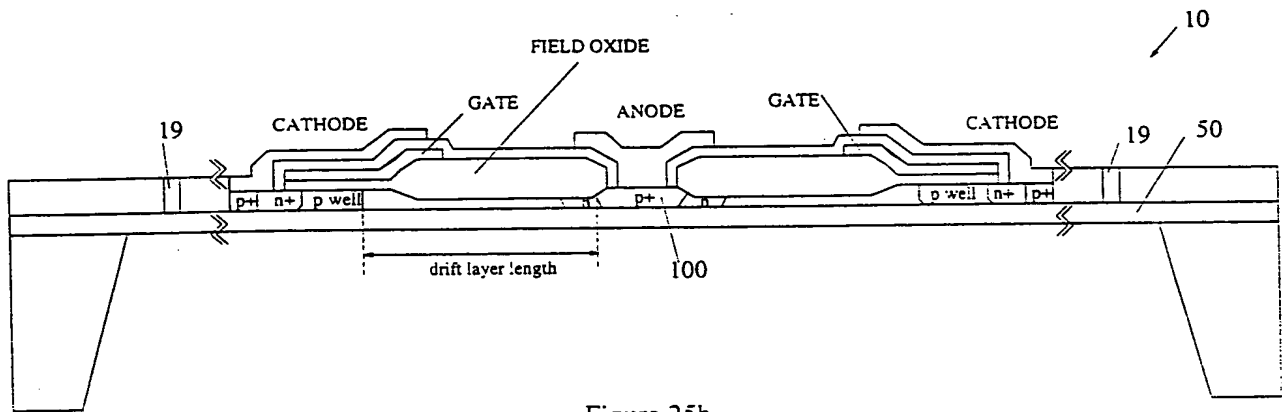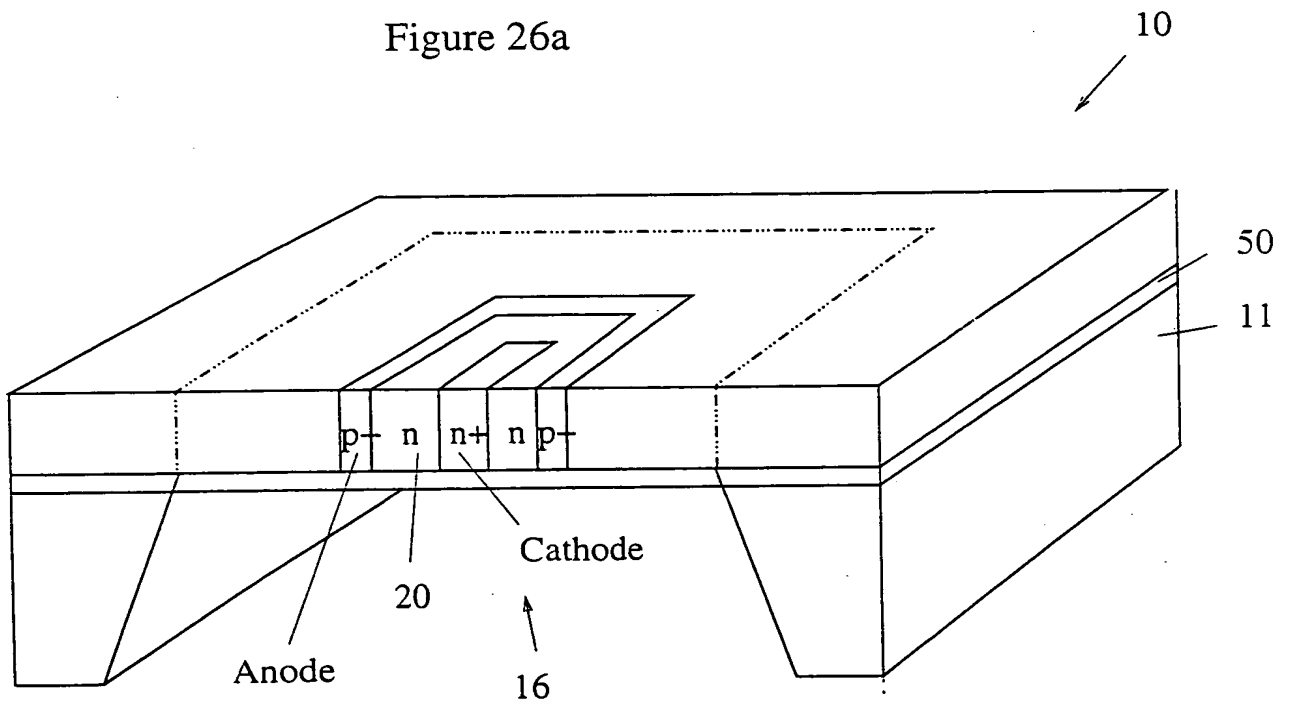
10

p+ n+ p well   n+   p well n+ p+

High voltage

potential lines
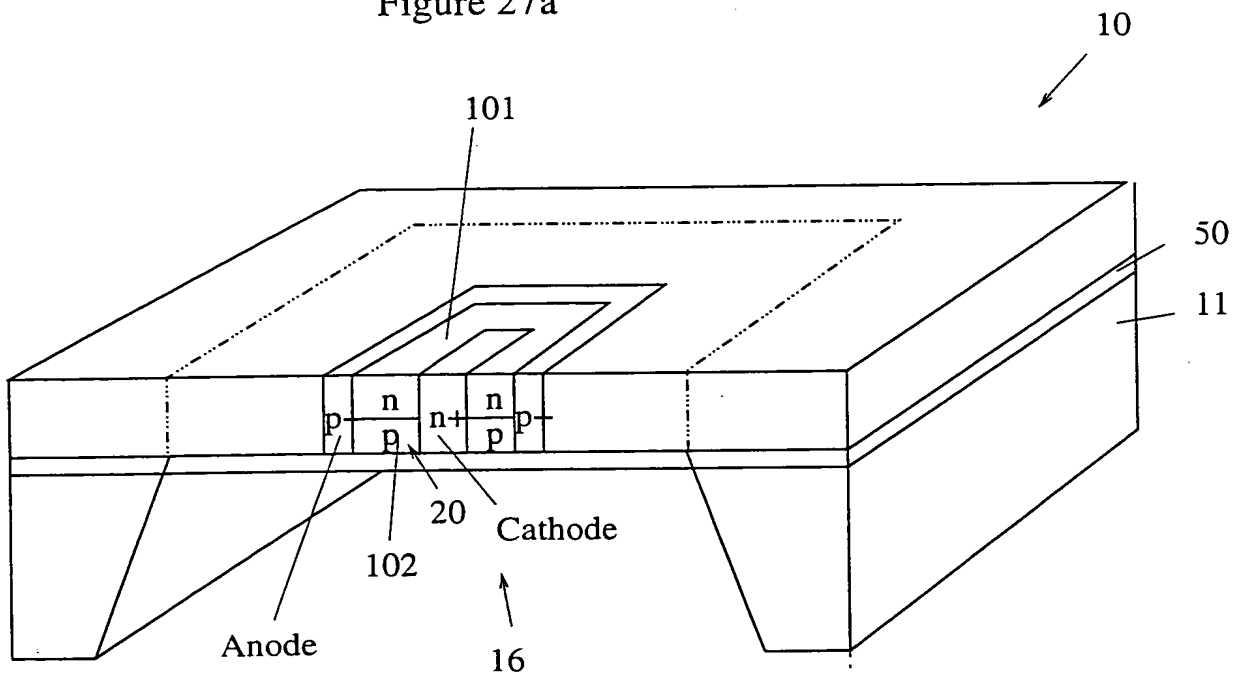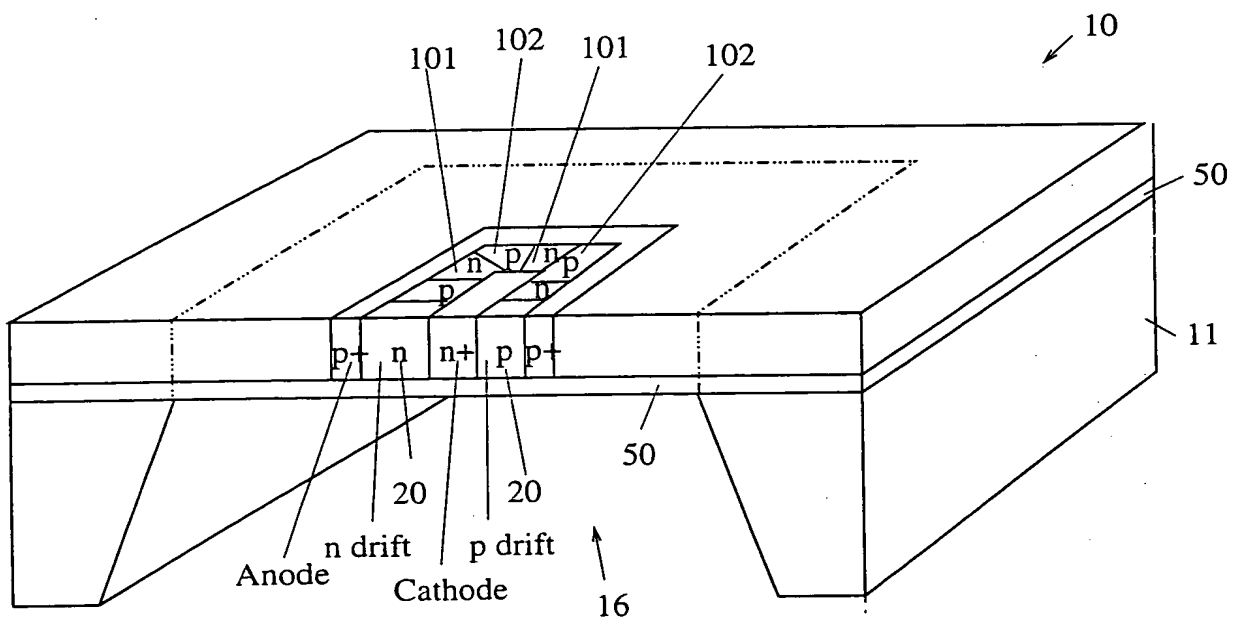
Figure 24

Figure 25a

Figure 25b

Figure 25c

10

11

p+ n | n+ n p+

Cathode

20

Anode

16

Figure 26a

10

50

11

p+ n | n+ n p+

Cathode

20

Anode

16

Figure 26b

10

101

11

| p | n | | n | | |
| | p | n+ | p | p |

20

Cathode

102

Anode

16

Figure 27a

10

101

50

11

| p | n | | n | | |
| | p | n+ | p | p |

20

Cathode

102

Anode

16

Figure 27b

Figure 28a

Figure 28b

source gate drain

p drift

n+ 19 10

p+

p

n

n+ p n+

11

11 20 n drift 19

16

Figure 29a

source gate drain

p drift

19 10

50

p+

p

n

n+ p n+

11

11 50 20 n drift 19

16

Figure 29b
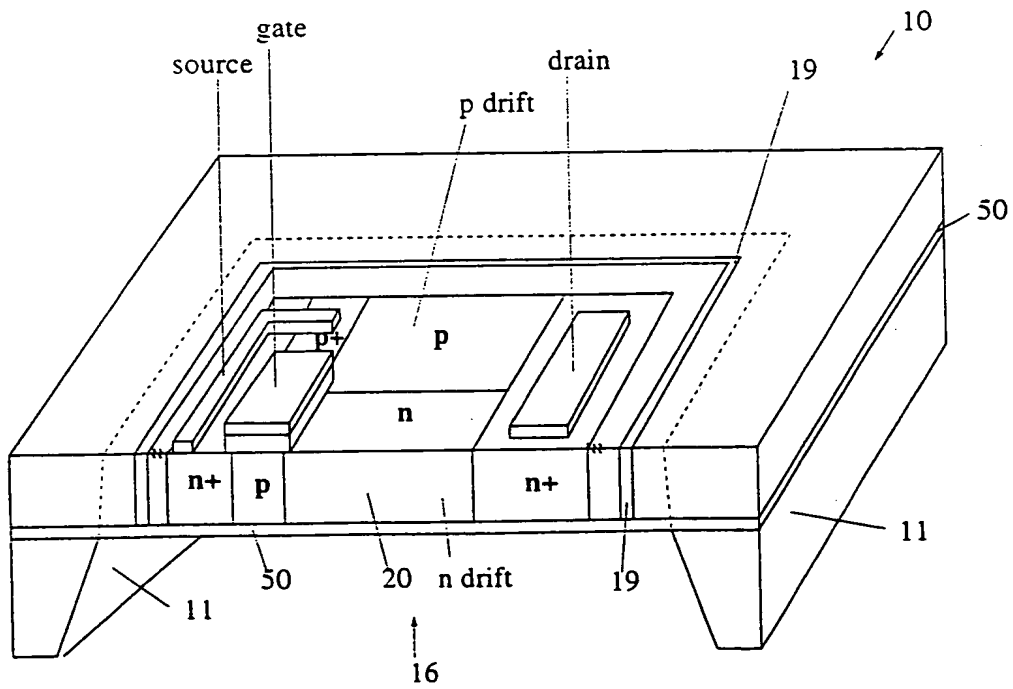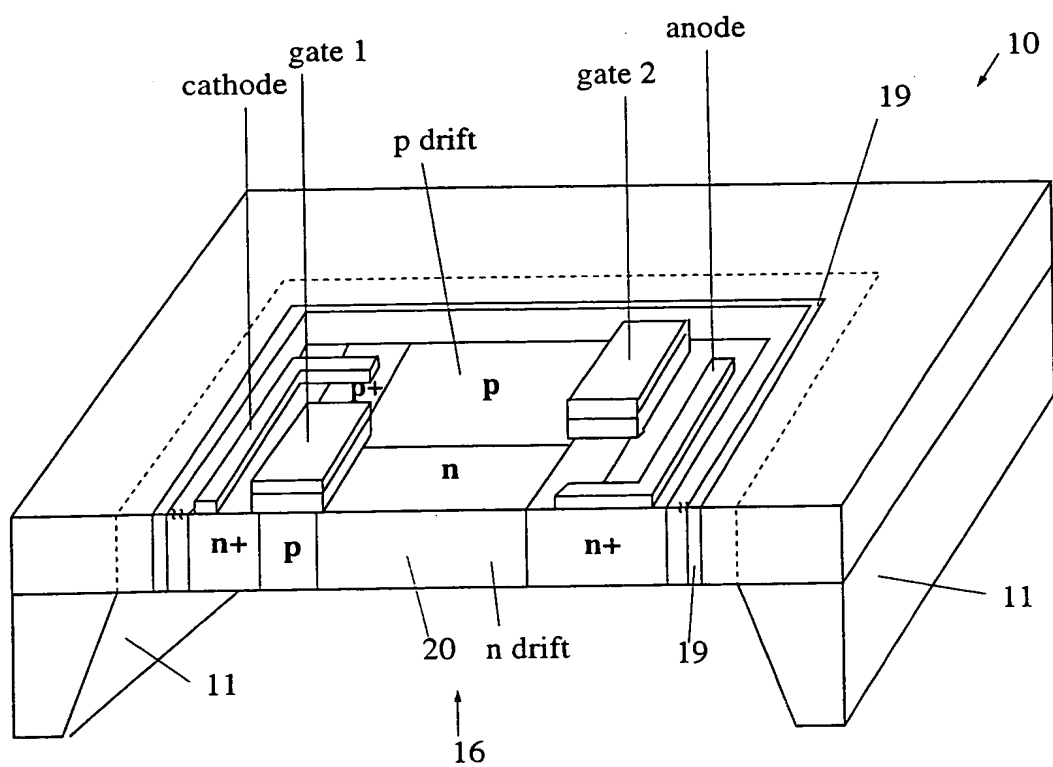
cathode

gate 1

anode

p drift

gate 2

10

19

p

n

p+

n+ | p

n+

11

11

20 | n drift

19

16
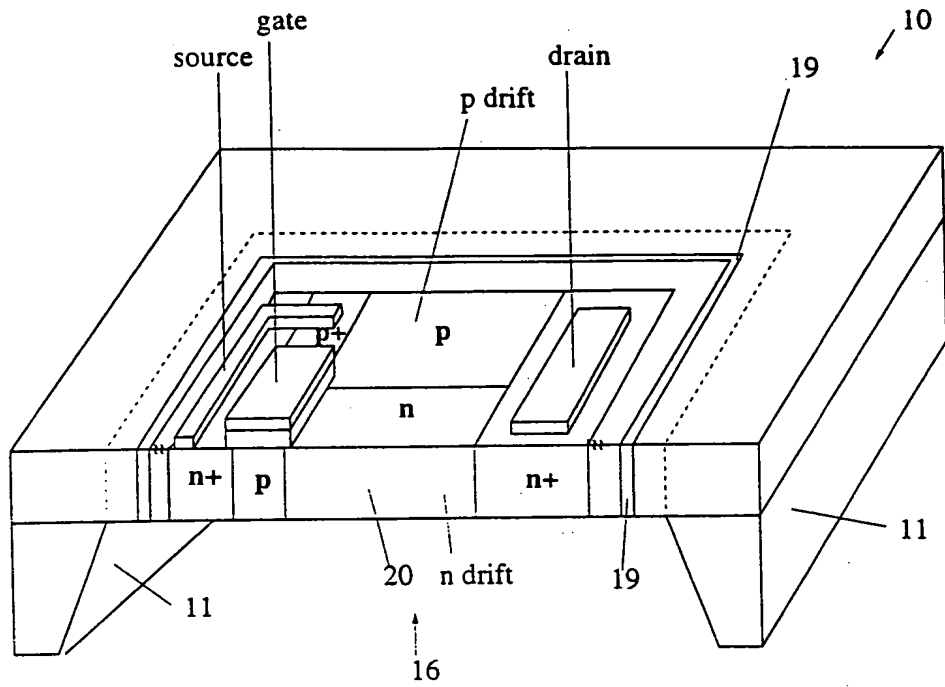
Figure 30

Figure 31

Figure 32

10

Active region 18   Termination region 106

15

13

20   103

11

17

11

103

Figure 33

Figure 34

Figure 35

13   14   50   11   16   11
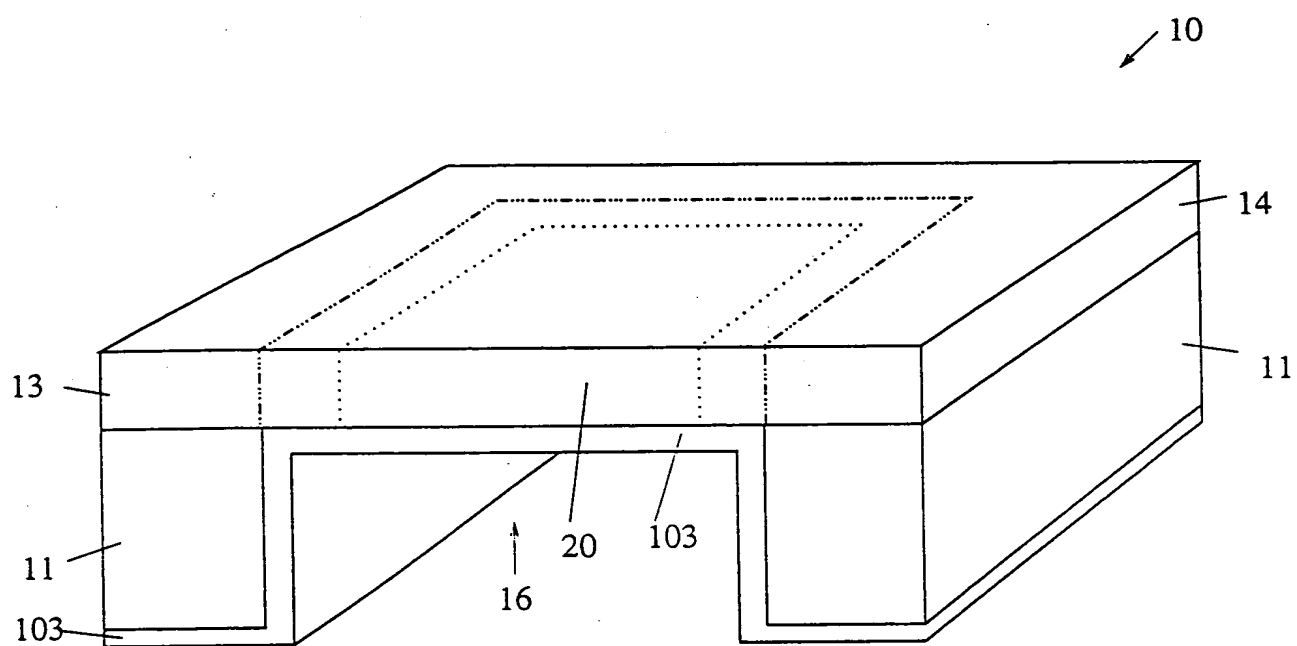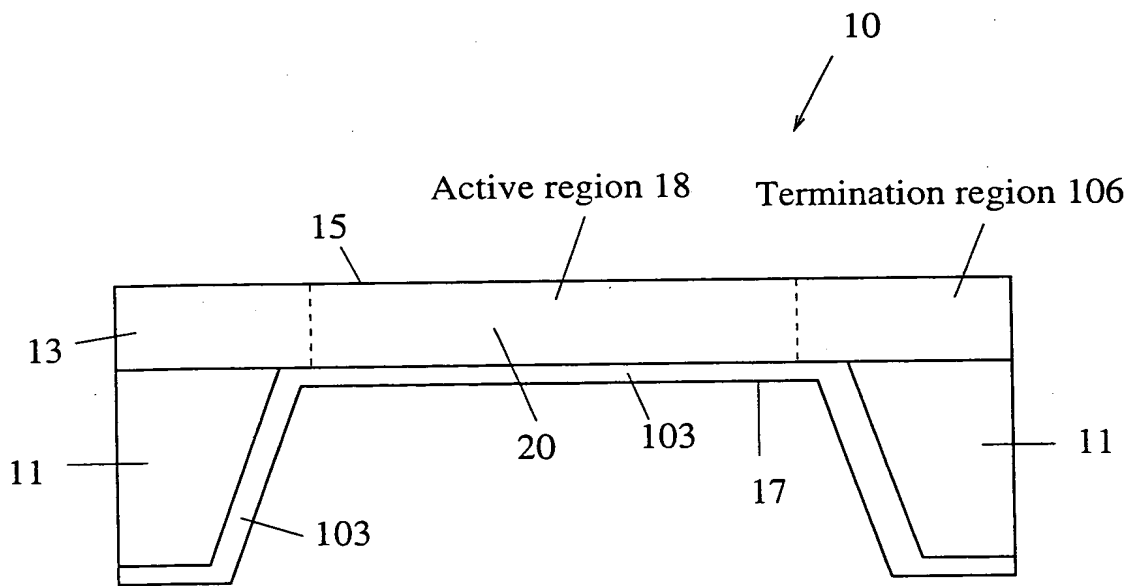
Figure 36a

13   14   50   17   11   16
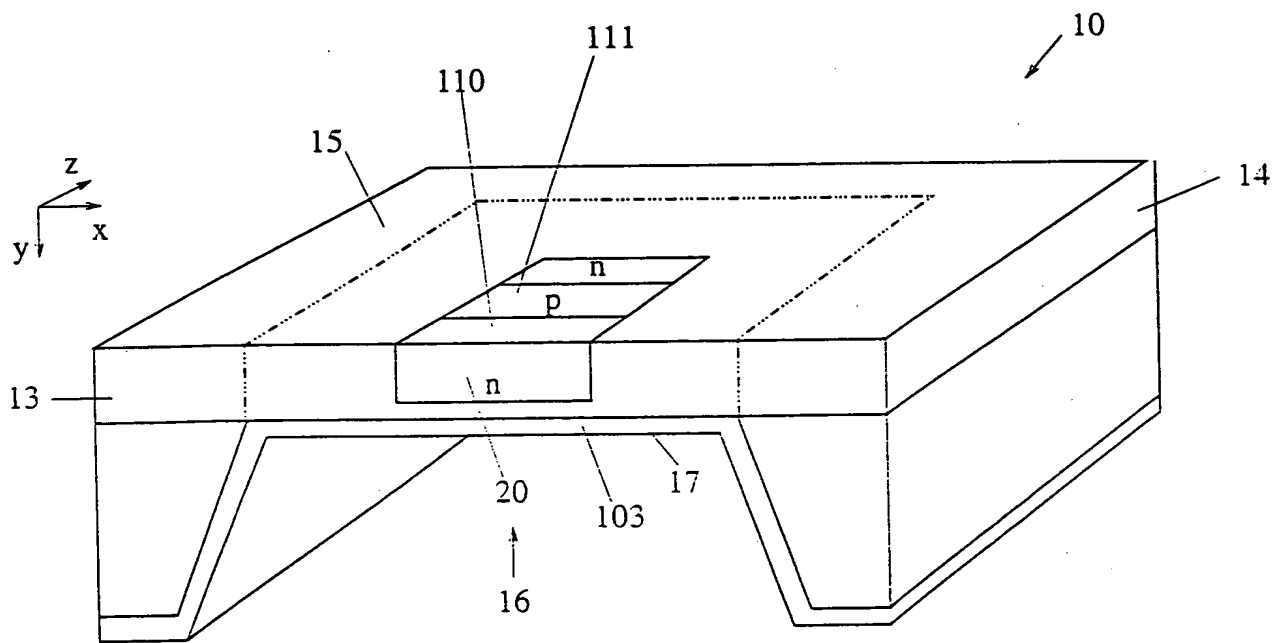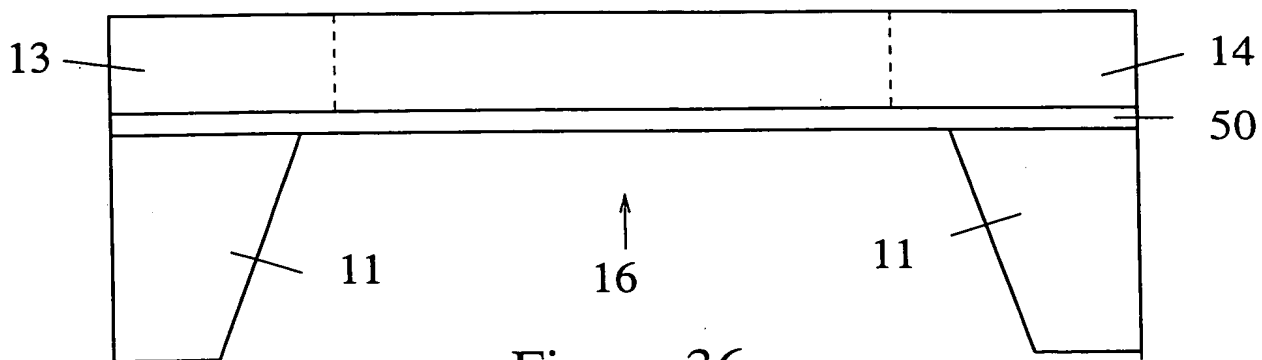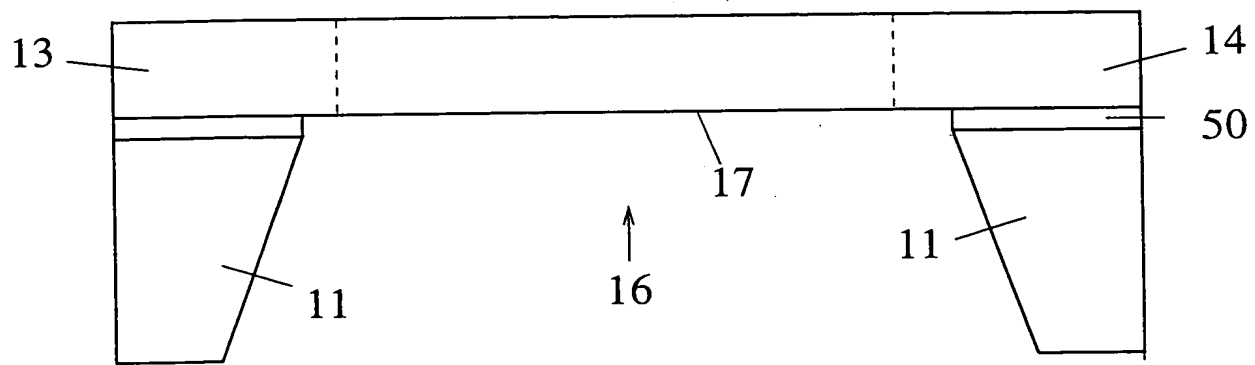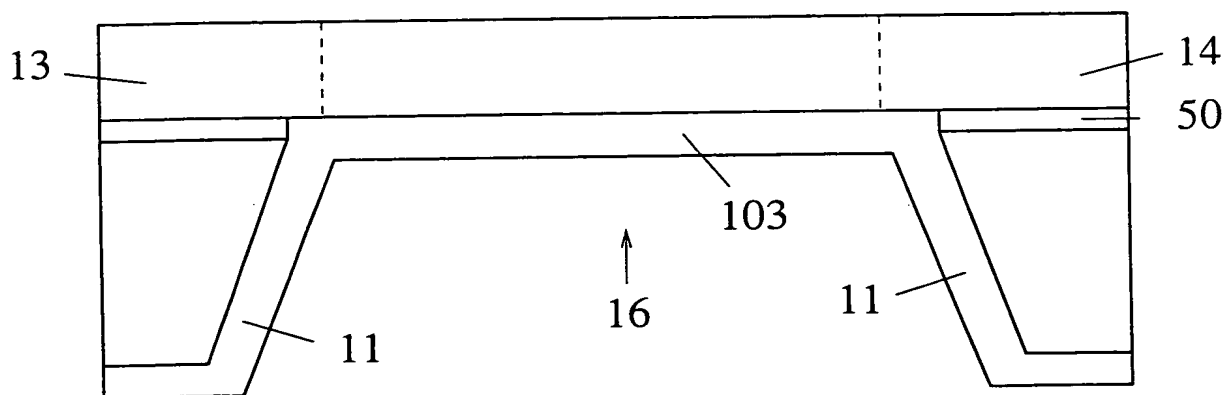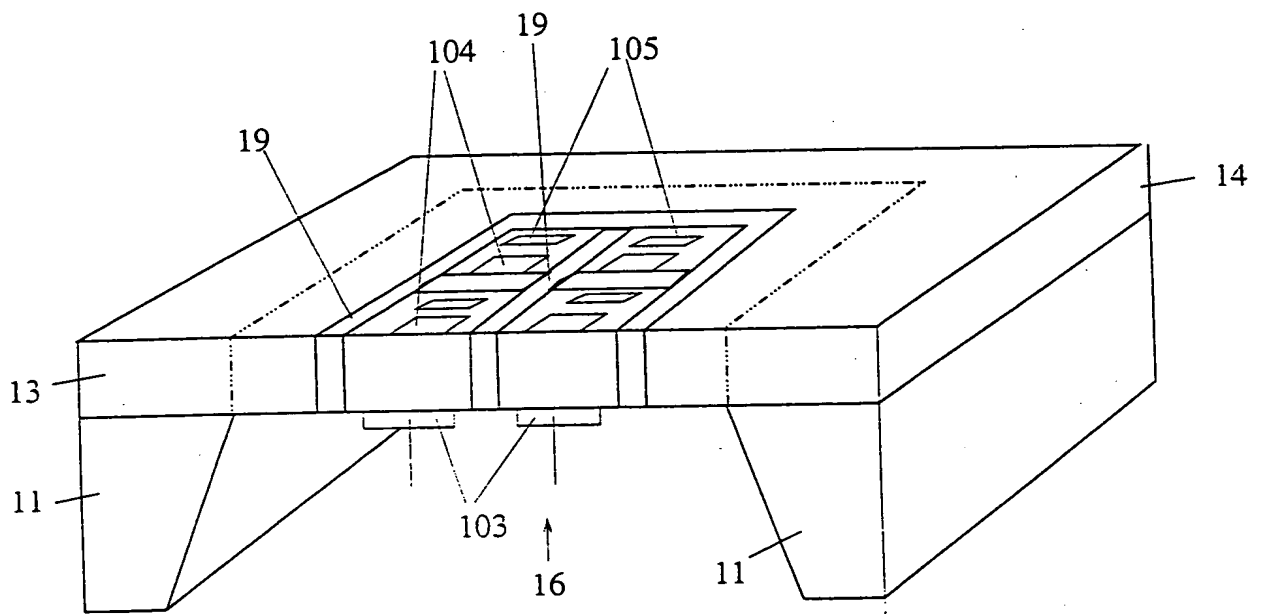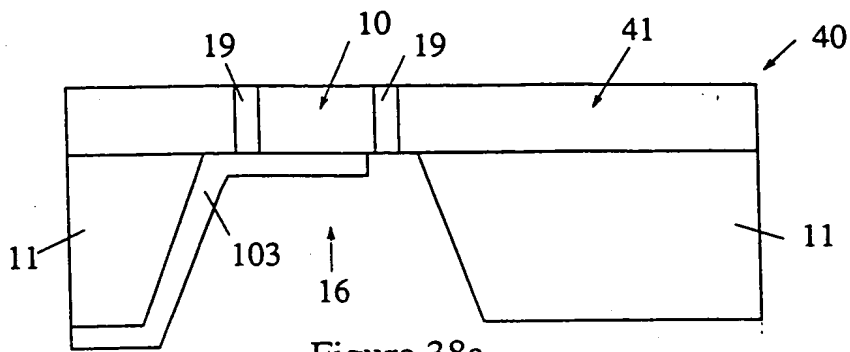
Figure 36b
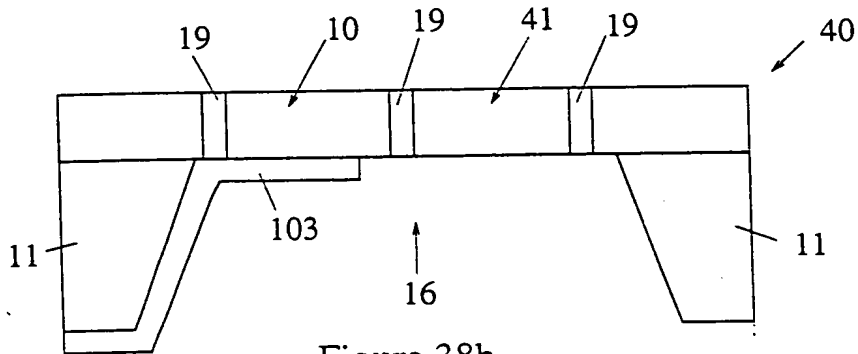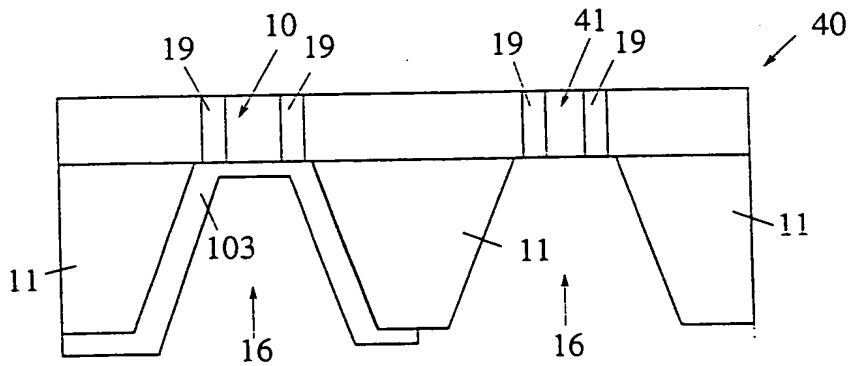
13   14   50   103   11   16   11
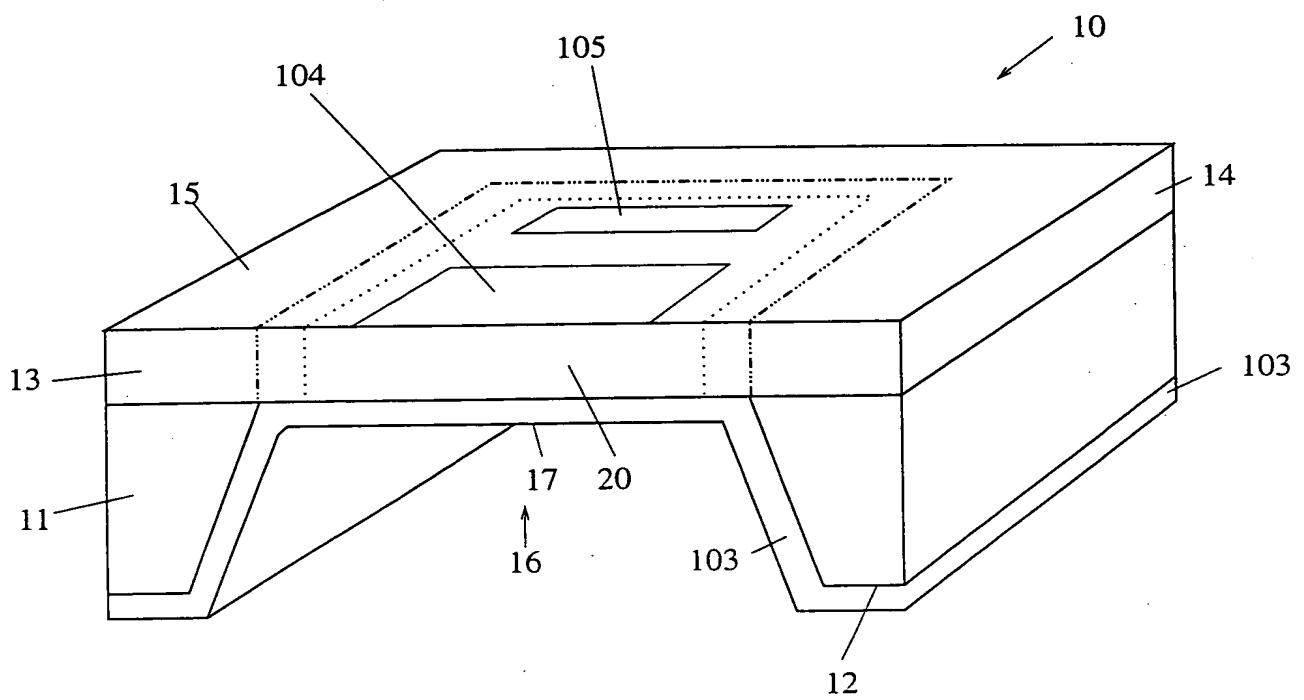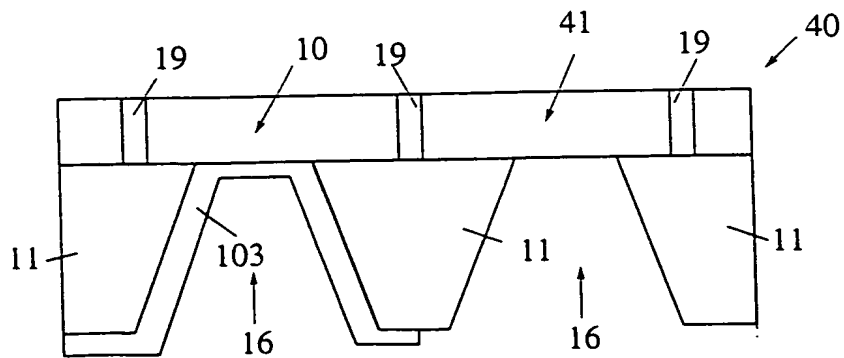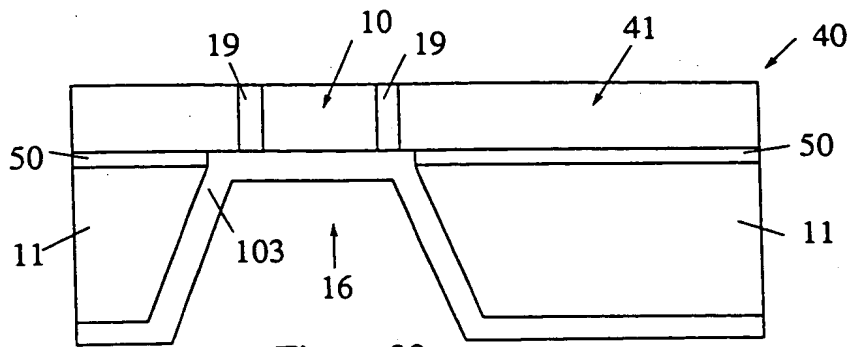
Figure 36c

Figure 37

Figure 38a

Figure 38b

Figure 38c

Figure 38d

Figure 39a
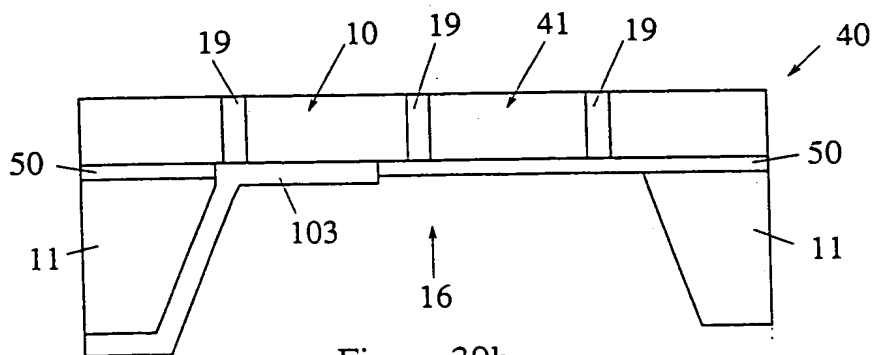
Figure 39b
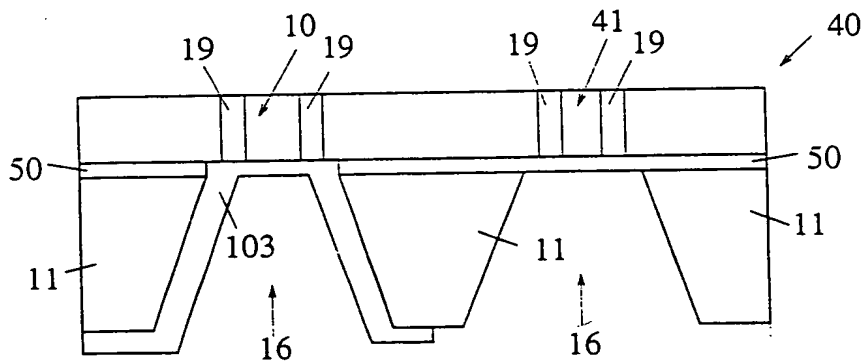
Figure 39c

Figure 39d

Figure 40a

Figure 40b

Figure 40c

Figure 40d

SOURCE 109 GATE 105 16
104 121 15

p+ n+
p
n-
n+
DRAIN 122
120 20 103 17
11 11

Figure 41a

109
SOURCE GATE 105 16
104 121 15

p+ n+
p
n-
n+
DRAIN 122
120 20 103 17
11 11

Figure 41b

105 16
SOURCE GATE 121 15
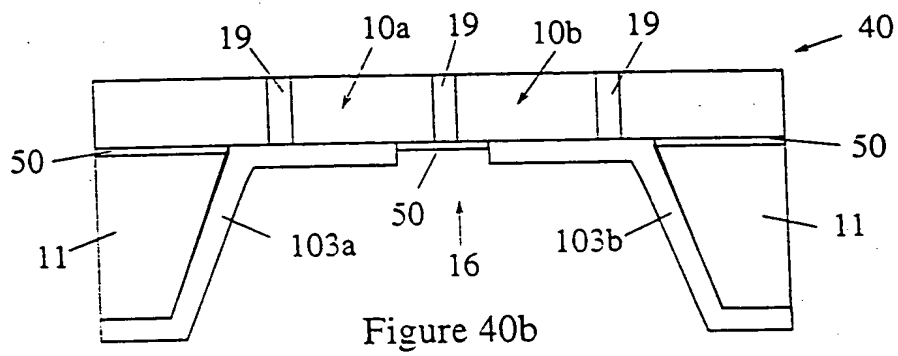
p+ n+
p
n-
n+
DRAIN 122
120 103
11 11

Figure 41c

Cathode 109 GATE 105 16
104 121 15
p+ n p n- p+ Anode
120 20 103 123 17 11
11 122

Figure 42a

109
Cathode GATE 105 16
104 121 15
p+ n p n- p+ Anode
120 103 123 17 11
11 20 122

Figure 42b

105 16
Cathode 121
GATE 15
p+ n+ p n- n p+ Anode
120 122 11
11 123 103

Figure 42c

SOURCE 1 GATE 1 ACTIVE MEMBRANES SOURCE 2 GATE 2

10a 10b 19

p+ n+ p n- n+ p+ n+ p n- n+

11 DRAIN 1 11 DRAIN 2 11

103a 16a 16c 16b 103b

Figure 43a

SOURCE 1 GATE 1 SOURCE 2 GATE 2

10a 10b 19

p+ n+ p n- n+ p+ n+ p n- n+

50 50
11 DRAIN 1 DRAIN 2 11

103a 16a 50 11 16b 103b

Figure 43b